Q & A - Biodolomer® and biodegradable biomaterial in general

What is Biodolomer®?

Biodolomer® is a biodegradable biomaterial sourced from renewable resources - sugarcane, rapeseed oil and mineral (calcium carbonate).

Where is Biodolomer® made?

It is manufactured in Helsingborg, Sweden.

What is Biodegradation?

Biodegradation is a chemical process in which materials are metabolized to CO2, water, and biomass with the help of microorganisms. The process of biodegradation depends on the conditions (e.g. location, temperature, humidity, presence of microorganisms, etc.) of the specific environment (industrial composting plant, garden compost, soil, water, etc.) and on the material or application itself. Consequently, the process and its outcome can vary considerably.

Are any contaminants or harmful substances left behind when compostable plastics biodegrade?

Biodolomer® is tested and certified according to the European standard for industrial composting EN 13432 are required to disintegrate after 12 weeks and fully biodegrade after six months. That means that 90 percent or more of the plastic material will have been converted to CO2. The remaining share is converted into water and biomass, which no longer contains any plastic. EN 13432 also includes test on ecotoxicity and heavy metal contents to ensure that no harmful substances are left behind.

What are the advantages of biodegradable/compostable Biodolomer® products?

Using biodegradable and compostable products such as biowaste bags, fresh food packaging, or disposable tableware and cutlery increases the end-of-life options. In addition to recovering energy and mechanical recycling, industrial composting (organic recovery / organic recycling) becomes an available end-of-life option.

Compostability is a clear benefit when plastic items are mixed with biowaste. Under these conditions, mechanical recycling is not feasible, neither for plastics nor biowaste. The use of compostable biomaterials makes the mixed waste suitable for organic recycling (industrial composting and anaerobic digestion), enabling the shift from recovery to recycling (a treatment option which ranks higher on the European waste hierarchy). This way, biowaste is diverted from other recycling streams or from landfill and facilitating separate collection – resulting in the creation of more valuable compost.

What are the required circumstances for a compostable product to compost?

Industrial composting is an established process with commonly agreed requirements concerning temperature and timeframe for biodegradable waste to metabolize to stable, sanitized products (biomass) to be used in agriculture (humus/fertiliser). This process takes place in industrial or municipal composting plants. These plants provide controlled conditions, i.e. controlled temperatures, humidity, aeration, etc. for a quick and safe composting process.

The criteria for the industrial compostability of packaging are set out in the European standard EN 13432. EN 13432 requires the compostable plastics to disintegrate after 12 weeks and fully biodegrade after six months. That means that 90 percent or more of the material will have been converted to CO2. The remaining share is converted into water and biomass – i.e. valuable compost.

Do (industrially) compostable biomaterials like Biodolomer® decrease the quality of the compost?

Compostable biomaterial that are tested and certified according to the European standard for industrial composting EN 13432 are required to disintegrate after 12 weeks and fully biodegrade after six months. That means that 90 percent or more of the plastic material will have been converted to CO2. The remaining share is biomass, which no longer contains any plastic. EN 13432 also includes test on eco-toxicity and heavy metal contents to ensure that no harmful substances are left behind.

Very short composting cycles may not be sufficient to allow for a full disintegration of some types of biowaste as well as for some compostable packaging. However, leftover scraps (usually ligno-cellulosics) in composting plants are sifted out and added to the next fresh compost batch for another composting cycle where they fully metabolise to water, carbon dioxide, and biomass.

What is the difference between 'biodegradable' and 'compostable'?

Biodegradation is a chemical process in which materials are metabolized to CO2, water, and biomass with the help of microorganisms. The process of biodegradation depends on the conditions (e.g. location, temperature, humidity, presence of microorganisms, etc.) of the specific environment (industrial composting plant, garden compost, soil, water, etc.) and on the material or application itself. Consequently, the process and its outcome can vary considerably.

In order to be recovered by means of organic recycling (composting) a material or product needs to be biodegradable. Compostability is a characteristic of a product, packaging or associated component that allows it to biodegrade under specific conditions (e.g. a certain temperature, timeframe, etc). These specific conditions are described in standards, such as the European standard on industrial composting EN 13432 (for packaging) or EN 14995 (for plastic materials in general). Materials and products complying with this standard can be certified and labelled accordingly.

Please note that in order to make accurate and specific claims about compostability the location (home, industrial) and timeframe need to be specified.

How does industrial composting (aerobic treatment) of Biodolomer® work?

Biodolomer® is tested and certified according to the European standards for industrial composting EN 13432 (for packaging). These composting plants provide controlled conditions, i.e. controlled temperatures, humidity, aeration, etc. for a quick and safe composting process.

EN 13432 requires for the compostable plastics to disintegrate after 12 weeks and fully biodegrade after six months. That means that 90 percent or more of the plastic material will have been converted to CO2. The remaining share is converted into water and biomass – i.e. valuable compost.

Compost is used as a soil improver and can in part also replace mineral fertilizers.

Are Biodolomer® a solution for the problem of marine litter?

Marine litter is one of the main threats to the environment. The largest share of marine litter consists of plastics that originate from a variety of sources, including shipping activities, ineffectively managed landfills, and public littering. In order to minimize and ultimately prevent further pollution of the marine environment, the full implementation of EU waste legislation and an increase in the efficiency of waste management around the globe are crucial. Moreover, the introduction of a Europe-wide ban on landfilling for plastic products and appropriate measures to expand recycling and recovery of plastic waste are necessary. In March 2019 the EU voted to ban 10 common one-time-use made from conventional plastics.

In areas where separate biowaste collection exists, compostable biowaste bags can help divert biowaste – including the bags in which it is collected – from landfills, thereby reducing the amount of plastic bags entering into the marine environment in the first place. Yet, biodegradable plastics should not be considered a solution to the problem of marine litter. Littering should never be promoted or accepted for any kind of waste, neither on land nor at sea – including all varieties of plastics. Instead, the issue needs to be addressed by educative and informative measures to raise awareness for proper and controlled ways of management, disposal, and recycling.

The UNEP report on 'bioplastics and marine litter' (2015) recognizes that polymers, which biodegrade on land under favorable conditions, also biodegrade in the marine environment. The report also states, however, that this process is not calculable enough at this point in time, and biodegradable plastics are currently not a solution to marine litter. GAIA agrees with the report's call for further research and the development of clear standards for biodegradation in the marine environment. Currently, there is no international standard available that appropriately describes the biodegradation of plastics in the marine environment. However, several standardization projects are in progress at ISO and ASTM level on how to test marine biodegradation processes.

What is meant by 'organic recycling'?

Organic recycling is defined by the EU Packaging and Packaging Waste Directive 94/62/EC (amended in 2005/20/EC) as the aerobic treatment (industrial composting) or anaerobic treatment (biogasification) of packaging waste.

The EU Directive refers to the harmonized European standard for the industrial compostability of plastic packaging: EN 13432.

In order to make organic recycling of biodegradable packaging more effective, a mandatory separate collection of biodegradable waste and legal access for certified compostable products to enter the respective recycling systems would be needed.

Do bioplastics 'contaminate' mechanical recycling waste streams?

As with conventional plastics, bioplastics need to be recycled separately (by stream type). Available sorting technologies such as NIR (near infrared) help to reduce contamination.

Innovative materials such as Biodolomer® can technically easily be sorted and mechanically recycled. Once sufficiently large volumes are sold on the market, the implementation of separate recycling streams for Biodolomer® will become economically viable for recyclers.

Can Biodolomer® be mechanically recycled?

The spillage from the production of Biodolomer® is mechanically recycled at the plant.

The post-consumer recycling of Biodolomer® for which no separate stream yet exists, will be feasible, as soon as the commercial volumes and sales increase sufficiently to cover the investments required to install separate recycling streams. It is expected, that new separate recycling streams for Biodolomer® and similar biomaterials will be feasible and introduced in the short to medium term.

Can Biodolomer® be integrated into established recycling and recovery schemes?

Innovative materials such as Biodolomer® can be mechanically recycled. Once sufficient volumes are on the market, the establishment of a separate recycling stream will become feasible.

Biodegradable products that have been certified compostable according to EN 13432 are suitable for industrial composting. All bioplastic materials offer (renewable) energy recovery as they contain a high energy value.

Are Biodolomer® more sustainable than conventional plastics?

Bio-based plastics have the same properties as conventional plastics but also feature the unique advantage to reduce the dependency on limited fossil resources and to potentially reduce greenhouse gas emissions. Consequently, bio-based plastics can help to decouple economic growth from the resource depletion and help the EU to meet its 2020 targets of greenhouse gas emissions reduction. Moreover, biomaterial can make a considerable contribution to increase resource efficiency through a closed resource cycle and especially if bio-based materials and products are being either reused or recycled and eventually used for energy recovery (i.e. renewable energy).

Are GMO crops used for Biodolomer®?

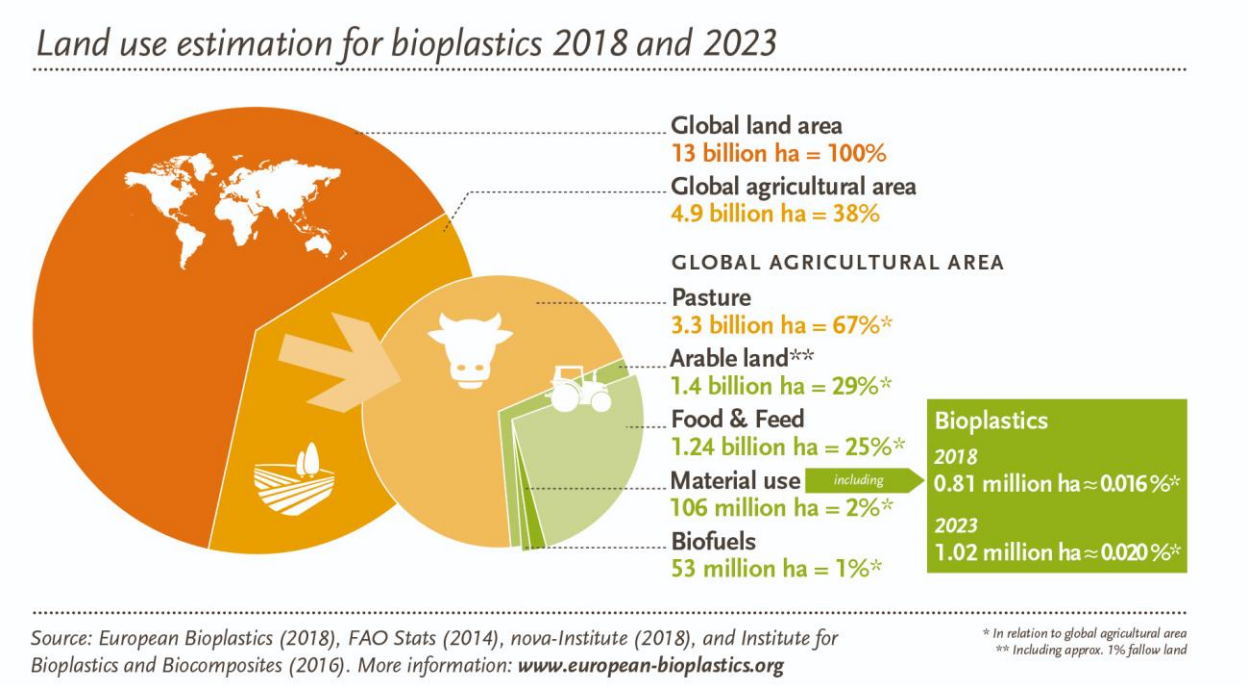
No.

Is there competition between food, feed and bioplastics regarding agricultural area?

The feedstock currently used for the production of bioplastics relies on only about 0.02 percent of the global agricultural area – compared to 97 percent of the area, which is used for the production of food and feed. This clearly demonstrates that there is no competition between food/feed and industrial production.

Of the 13.4 billion hectares of global land surface, around 38 percent (5 billion hectares) is currently used for agriculture. This includes pastures (67 percent, approx. 3.3 billion hectares) and arable land (29 percent, approx. 1.4 billion hectares). The arable land is further divided into areas predominantly used for growing food crops and feed (25 percent, approx. 1.24 billion hectares), as well as crops for materials (2 percent, approx. 106 million hectares, including the 820,000 hectares used for bioplastics, 0.016%)* , and crops for biofuels (1 percent, approx. 53 million hectares).

Moreover, advanced integrated production processes, for example in biorefineries, are already able to produce several different kinds of products out of one specific feedstock – including products for food, feed, and products, such as bioplastics.



How much agricultural area is used for bioplastics?

The feedstock currently used to produce bioplastics relies on only about 0.02 percent of the global agricultural area – compared to 97 percent of the area, which is used for the production of food and feed. Despite the predicted continued growth in the bioplastics market at the current stage of technological development, the share of global agricultural area used to grow feedstock for the production of bioplastics will remain around 0.02 percent in 2023. This clearly demonstrates that there is no competition between food/feed and industrial production.

What are the relevant standards for bioplastics?

Technical Committee (TC) 411 of CEN has developed different standards for the measurement of the renewable content of biobased materials and, therefore, bioplastics. Most importantly, the European norm EN 16640 „Bio-based products – Determination of the bio-based carbon content of products using the radiocarbon method", published in 2017, describes how to measure the carbon isotope 14C (radiocarbon method). In addition, the standard EN 16785-1 „Bio-based products – Bio-based content – Part 1: Determination of the bio-based content using the radiocarbon analysis and elemental analysis "has been developed to also account for other bio-based elements in a polymer through elemental analysis.

EN 13432 "Requirements for packaging recoverable through composting and biodegradation" is the European standard for biodegradable packaging designed for treatment in industrial composting facilities and anaerobic digestion. It requires at least 90% disintegration after twelve weeks and includes tests on ecotoxicity and heavy metal content.

Which labels for bioplastic products do exist in Europe?

Labels referring to the bio-based content are for example DIN-Geprüft biobased, OK biobased (both offering different labels reflecting the product's share of bio-based content), and the new logo by Nederlandse Norm (NEN), based on EN 16785-1.

Labels for industrially compostable products are, for example, the Seedling Logo, OK Compost, and DIN-Geprüft Industrial Compostable.

Labels proving home compostability are OK compost Home and the DIN-Geprüft Home Compostable Mark.