european bioplastics

FACT SHEET

European Bioplastics

Biodegradable and compostable bioplastic bags in anaerobic digestion

Optimal processing with prevailing technologies

Biodegradable and compostable products that are certified according to the harmonized European standard EN 13432 (or EN 14995) are suitable for organic recycling and will completely biodegrade in an industrial composting plant, with no adverse effects on the process or on the final product (compost). These materials are working well in different composting plant types with different process duration.[1]

One application of biodegradable bioplastics are biodegradable and compostable organic waste bags. The utilisation of these bags increases the amount of organic waste collected from households, especially food waste.[2]

Compostable bags contribute to increased amounts of separately collected organic waste.

Organic waste from household and commercial sources is very often treated in industrial composting. However, it is increasingly processed in Anaerobic Digestion (AD) plants to produce biogas. AD plants that convert biowaste are ideally connected with a subsequent composting step.[3] This "cascade use" of organic waste by first exploiting its energy potential and second producing compost as a fertilizer allows for an efficient material and energetic use of biowaste. The combination of AD and composting gives the best results as to renewable energy and quality compost production.

Anaerobic digestion plus composting is an ideal treatment of biowaste.

There are three main AD technologies representing around 90% of all plants: wet AD, dry batch AD, and dry plug-flow AD, operating either with mesophilic (< 40°C) or thermophilic (40°C - 70°C) temperatures. For the treatment of organic waste, dry technologies currently represent around 75% of all plants in Europe.[4]

The behaviour and optimal treatment of compostable waste bags for organic waste in the different technologies can be summarised as follows:

- In dry batch processing, there often is no size-reducing pre-treatment step. Compostable bags thus may enter the digestion step without being sorted out. To maximise biogas yield, it is recommended that the bags are ripped open before digestion. Any remnants of these items after diges-

[1] *B. Fink et al. "How compatible are compostable bags with major industrial composting and digestion technologies?", C.A.R.M.E.N., 2011*
[2] *See Kanthak/Söling (2012) and Garaffa (2014)*
[3] *In some European countries, such as UK and Sweden, digestion is usually not followed by composting.*
[4] *Bruno Mattheeuws: State of the art of anaerobic digestion of municipal waste in Europe in 2015. Presentation held at the ISWA conference 2015 in São Paulo.*

tion soon biodegrade in the subsequent composting step, which is typically finalized by a sieving and/or refining step.

Examples for such plant types that are processing organic waste bags can be found in Straubing/Germany or Monterey/California.

- In dry plug-flow processing, usually size reduction is applied as a pre-treatment step, typically by shredding. Thus, compostable bags are shredded together with the waste material. Larger parts will be sorted out and can be added to the composting step. Small pieces of biodegradable bags, however, do not disturb the digestion process. Also here, the subsequent composting step is typically finalized by a sieving and/or refining step.

  Examples: Witten Bebbelsdorf/Germany, Monnerich/Luxemburg, Tenneville/Belgium

- In short-cycle wet AD, biodegradable plastic bags are ideally sorted out during the pre-treatment phase and thus skip the digestion process. When they do enter the pulping process, bags are usually ripped open and then separated by sedimentation or buoyancy before digestion. The bags or its remnants are sent directly to composting.

  Example: Maniago/Italy

Due to its relatively short retention time, many organic materials, including straw, branches, feathers, or wool do not biodegrade completely in anaerobic digestion but in the following composting step. These materials need an aerobic environment to complete degradation and produce compost.

This usually also applies to compostable bioplastic bags. Their suitability, therefore, does not only depend on the biodegradability under anaerobic conditions but also on a proper set up of pre-and post treatment at an AD plant and the existence of an additional composting step, which is given in most plants.

Rising amounts of organic waste lead to increased biogas yields.

Anaerobic digestion is thus in general a suitable treatment for biodegradable and compostable bioplastics certified according to EN 13432. This applies especially to biodegradable and compostable organic waste bags, which, by increasing the amount of separately collected biowaste, contribute to rising outputs of renewable energy and compost.

References/further reading:

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