Are bioplastics better than conventional plastics for the environment?

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Super-Biodegradable?

Even with the best waste management mechanisms in place, it's reasonable to expect some plastic to escape. Consider the abrasion caused by vehicle or bike tyres, ship paints, footwear, or synthetic clothing. Plastic particles that are small enough to fly through the air will be difficult to confine [1].

So, could we create a material that can be broken down almost anywhere?

According to Wurm, molecular triggers could theoretically be built into materials to tell them when to disintegrate. He comments, "It sounds fancy, and it is fancy, and it is expensive." Even if the resources were available, locating and incorporating molecular triggers for every material in every environment appears to be a near-impossible undertaking [2].

Different Chemicals, Different Problems

Furthermore, looking at only the plastic itself is never enough when assessing the effects of plastic items on persons and the environment. A single plastic product can contain dozens of chemicals, some of which could harm humans or other organisms if discharged into the environment and taken up.

Lisa Zimmerman, a Ph.D. student at Goethe University in Frankfurt am Main's Department of Aquatic Ecotoxicology, has conducted research that suggests chemical mixtures present in biodegradable or bio-based plastic products can affect the metabolic activity of the bioluminescent bacterium Aliivibrio fischeri. She discovered that these chemical mixes have the ability to create oxidative stress or alter the hormonal system in living creatures in a series of additional studies [3].

"Based on my findings, bioplastics are not always safer than ordinary plastics in terms of the toxicity of the chemical combinations they contain," Zimmermann adds

Niche applications

If plastics that are now promoted as "biodegradable" are lost or littered, they will add to plastic pollution. They do not degrade as rapidly or completely as the word implies in the environment, posing a threat to wildlife and ecosystems. However, there are a few instances where employing biodegradable plastics may be beneficial to the environment [4].

Bags that are biodegradable under industrial circumstances are used to collect organic garbage in various countries. They can provide a cleaner and more convenient solution for consumers to collect food waste for composting than non-disposable containers.

Enzo Favoino, a waste management expert from Italy's Scuola Agraria del Parco di Monza and chair of Zero Waste Europe's Scientific Committee, is confident that this is the way to go. Because there are fewer organics in the trash, there is less fermentation, allowing waste collection crews to come by less frequently. He claims that not only would this save money, but it will also increase the recycling rates of other materials such as paper, glass, plastic, and metal. Food scraps are also diverted from landfills and dumps, where they can produce methane, a potent greenhouse gas that contributes to climate change, by collecting organic garbage separately.

However, not every country has the necessary infrastructure to use biodegradable bags for these purposes. Compostable bags are filtered out of organics in Germany, for example, by technology that does not discriminate between compostable and conventional plastic.

Biodegradable plastics are now being promoted as agricultural mulching films, which farmers can simply leave on the fields to plough under. Plastic mulch film has been used on fields for decades to aid crop growth while conserving pesticides and water. However, if ordinary plastics are not removed and destroyed, this so-called Plasticulture can cause "white pollution" to collect on farms [5].

Is it safe to use biodegradable film? If they can be shown to decompose in the soil, they will produce less pollution. However, wind or animals may transfer broken film fragments into the air, rivers, or seas, where they may be unable to biodegrade

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