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ENVIRONMENT | PLANET OR PLASTIC?

What you need to know about plantbased plastics

Can bioplastics truly relieve pressure on the environment? Experts weigh in.

BY SARAH GIBBENS

At a glance, the name sounds promising, with a prefix that hints at an Earth-friendly product. But is bioplastic the panacea for our environmental woes? An easy-to-use single-use item that feels like plastic minus the guilt?

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What is bioplastic?

Bioplastic simply refers to plastic made from plant or other biological material instead of petroleum. It is also often called bio-based plastic.

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It can either be made by extracting sugar from plants like corn and sugarcane to convert into polylactic acids (PLAs), or it can be made from polyhydroxyalkanoates (PHAs) engineered from microorganisms. PLA plastic is commonly used in food packaging, while PHA is often used in medical devices like sutures and cardiovascular patches.

About eight percent of the world's oil is used to make plastic, and proponents of bioplastic often tout a reduction in this use as a major benefit. This argument rests on the idea that if a plastic item does release carbon once it's discarded, as it degrades, bioplastics will add less carbon to the atmosphere because they're simply returning the carbon the plants sucked up while growing (instead of releasing carbon that had previously been trapped underground in the form of oil).

However, that's not the end of the story. <u>One 2011 study from the University of</u> <u>Pittsburgh</u> found other environmental issues associated with growing plants for bioplastic. Among them: pollution from fertilizers and land diverted from food production.

Using a substance like corn for plastic instead of food is at the center of a debate over

OVERSIMPLIFICATION. It's true that a large portion of bioplastic is derived from corn and sugarcane, but those are not the only two plants from which you can create bioplastic. The full range includes many other plants such as: potato, rice, wheat, and others. There is also just as wide a range of types of plastics that can be made from plants outside of just PLA and PHA. For example, there are bio-based polyethylene (PE) products which are molecularly identical to petroleum-based PE but come from a renewable source.

FLAWED RESEARCH. This study is often cited to support this claim, but it is marred by numerous limitations and inaccurate assumptions.¹ For instance it only compares impacts from the production process, and ignores the comparative impacts of usage and end-of-life versus legacy plastics.

HERE ARE THE FACTS. Bioplastics production will not have a significant

STRAW MAN. No one is claiming bioplastic and bio-based materials will solve all of our environmental problems. The argument is that plant-based p-roducts are an improvement on the status quo, one that currently offers a number of solutions and the potential for far more with further research and innovation.

THERE'S MORE. This is a simplified version of the argument, but they point out a fact that the petroleum-based plastics industry consistently tries to blur -- plant-based plastics are made from products that remove carbon from the atmosphere and petroleum-based plastics are made from carbon buried deep in the ground.

MISLEADING. Bioplastics production will not have a significant impact on

agricultural resources used to grow food. Both the United Nation's Food and Agricultural Organization and the World Wildlife Foundation's Bioplastic Feedstock Alliance cite credible research which contends that while there are nuanced policy considerations for how resources are allocated, the use of bio-based materials should ultimately be accepted.²

WE AGREE THERE'S WORK TO BE

DONE. But this shouldn't turn us away from viewing bio-based materials as part of the solution. That's why we're partnering with businesses, nonprofits, and policy-makers to build infrastructure and technology to process renewable resources.

FAIR FRAMING? It is misleading to lump bioplastics in with petroleum-devived plastics. It's even worse to pit bioplastics against other bio-devived materials like those mentioned here. how resources should be allocated in an increasingly food-scarce world.

"The other value proposition is that plant biomass is renewable," Narayan adds. "It's grown all over the world. Oil is concentrated in regions. Bioplastics support a rural, agrarian economy."

Bio-based plastics have benefits, but only when taking a host of factors into consideration, says environmental engineer and National Geographic explorer Jenna Jambeck, who is also at the University of Georgia.

"Where is it grown? How much land does it take up? How much water is needed?" she gives as examples of important questions.

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What happens when we're done with it?

Depending on the type of polymer used to make it, discarded bioplastic must either be sent to a landfill, recycled like many (but not all) petroleum-based plastics, or sent to an industrial compost site.

Industrial composting is necessary to heat the bioplastic to a high enough temperature that allows microbes to break it down. Without that intense heat, bioplastics won't degrade on their own in a meaningful timeframe, either in landfills or even your home compost heap. If they end up in marine environments, they'll function similarly to petroleum-based plastic, breaking down into micro-sized pieces, lasting for decades, and presenting a danger to marine life.

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But environmentalists still say a serious dearth of industrial compost sites mean bioplastics will do little to curb the amount of plastic entering waterways.

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"We quickly realized that the idea of compostable plastic sounds very interesting, especially if you look at an area like Seattle, but there's still that human element of you and me," she says.

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Plastic made from petroleum or plants like corn is among the cheapest material for things like packaging, but smaller-scale manufacturers are developing even more natural alternatives. In the U.K., one boutique is growing fungus into lightweight furniture, and in the U.S., the Department of Agriculture is using a milk film to create packaging that keeps food fresh.

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impact on land use. A recent publication from European Bioplastics, informed by FAO stats, the nova-Institute, and the Institute for Bioplastics and Biocomposites, estimated that the 2017 total land use for bioplastics production is only 0.016% of global agricultural land, and the estimated land use for 2022 under current trends would be approximately 0.021% of global agricultural land³

WRONG. Heat is just one among the many factors that facilitate the breakdown of bioplastics. Industrial composting facilities provide the environment in which we can control the factors which cause bioplastics to properly break down into compost using a balance of heat, moisture, oxygen, and microbial activity.

THAT'S WHY WE'RE HERE. But this is no reason to abandon innovation of bio-based materials. Rather it illustrates the need for groups like PBPC to educate the public and encourage behavioral and policy changes that build a more circular economy.

SOURCES:

- 1. https://www.plasticsnews.com/article/20101206/NEWS/ 312069977/researcher-questions-credibility-of-pittsbur gh-u-bioplastics-study
- 2. http://news.bio-based.eu/nova-paper-2-on-bio-based-eco nomy-2/
- 3. https://www.european-bioplastics.org/how-much-land-d o-we-really-need-to-produce-bio-based-plastics/)



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Bioplastic is becoming a popular alternative for single-use plastic items like straws and utensils. PHOTOGRAPH BY REBECCA HALE AND MARK THIESSEN, NATIONAL GEOGRAPHIC

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