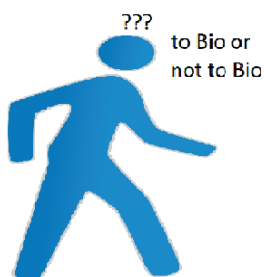


Is the Bioplastics the solution to plastic pollution problem?

Bioplastics maybe be a part of the solutions to reduce plastic pollution in the environment. A lot of things must be done if we really want to reduce plastic in our seas, bioplastics could be part of the game only if we know them and we use them correctly.
Carmine Di Fiore 18 Dicembre 2019



Despite its name, bioplastics are not ipso facto a sustainable solution.

You might expect bioplastic objects to dissolve down, when disposed of in your compost heap, or to at least to have a lower carbon footprint, but it might surprise you to find out these

expectations aren't necessarily true. Before to start to consider the bioplastics the panacea for all problems created by the plastic you have to pay attention to following 6 points:

1) First thing...what is bioplastic?

Bioplastic is a vague term, that can mean one or both of following two things:

a) bio-based plastic, namely the constituents are partially or entirely obtained from biomass (bio based) rather than from petrochemicals (fossil base)

AND / OR

b) biodegradable and compostable plastic (i.e. it can be broken down by enzymes present in nature), in a reasonable period¹ of time the enzymes are capable to transform it into its essential constituents, which can then be used again in natural processes. In principal, a bioplastic that is either — or both — of the definitions above reported should be an improvement on the non-bio-based, non biodegradable plastics. In the first case it reduces the use of fossil fuels and CO₂ emissions (bio-based), in the second case it will biodegrade more quickly (biodegradable).

2) Bio-based and biodegradable are NOT two side of the same coin. Despite being made from organic materials, bio-based plastic may be no biodegradable or compostable. Es. bio polyethylene (bio-PE) is notoriously made from sugar cane, but it's not biodegradable or compostable. It still remains "durable plastic²" as the same product made from petroleum's raw materials. If it gets into the ocean, it will cause the same troubles to our underwater friends as conventional polyethylene (PE).

3) The durable plastic derived or completely from petrochemicals or even from bio resource, added with some specific additives to make it break down more quickly in nature, could seems biodegradable. In fact this can give the idea might help to prevent long-lasting plastic waste on our beaches and in our oceans, but it is not true.

Because it remains and spreads in the environment a lot of small pieces (sometimes very small: "microplastics") of plastic that are not biodegradable and they will concentrate in the body first of fish and at the end in ours.

4) Biodegradable and compostable materials give significant advantages if they are properly disposed of. This mean that they need to be correctly collected with domestic organic waste (wet fraction), and moved to adequate facilities in order to be composted. Biodegradable plastics are compostable in 1-6 months, but only under very specific conditions (e.g. a constant temperature of 60°C with a regular top-up of microbes). In other words, in an industrial composting plants.

This doesn't mean that these materials are technically not recyclable, but due to the fact that are chemically different from conventional plastics , they can't be recycled with durable plastics. For example if a PLA bottle is not perfectly separated from PET's bottles, it's considered as a pollutant, contaminating and downgrading the quality of the recycled plastic output.

5) Production of bioplastic can compete with food production. In some case the raw material to produce the bio-based plastic is grown specifically as a feedstock (starch, sugar,...) for plastic, i.e. is not waste / or an agricultural by-product. In this case it will compete for the land with food production, for which there is growing demand (an estimated 70% increase in food production is required by 2050). Some bioplastics (e.g. PHA, PHB) that use microbes to turn waste food (and even human waste!) into plastic are being developed to help address this problem. Currently, the most common bioplastics are made from corn starch / sugar cane (but in principle also in this case it would be possible to use agricultural waste), this is necessary to use land in a sustainable way.

6) Last point only in Italy in the 2019 13,4 million tons (COREPLA) of plastic materials were placed on the market in the form of packaging alone. If all the world production of biodegradable bioplastics (PLA, PBS, PBAT, PBST, PBSeT, PHA, PHB, as well plus some Starch and plus some mineral fillers) had been used all over Italy, it would not have reached 1 million tons. Only this year we luck more than 12 milion of tons. How can we think that next year biodegradable bioplastics can meet the demand even of Europe alone.

¹ Comparable with the life of living beings. Natural polymers such as cellulose, in the form of a large trunk, can withstand even a few years but after one or two years if they remain in contact with the natural environment it is again broken down into their basic constituents which become so available for new natural processes.

² Plastics that remain in the environment without any appreciable degradation for a period more than 500 years.

Let's come back to our question: are bioplastics better for the planet?

Bioplastics — either by reducing our dependence on fossil fuels and overall CO2 emissions, or by improving the biodegradability of plastics — are, in many cases, an improvement upon existing petrochemical-based, non-biodegradable plastic.

But they are far from perfect. Their volume is not enough, if you take a look at the life-cycle of a bioplastic, including the context for its production, use, and end-of-life, it's clear that it requires a great deal more than swapping out conventional packaging for bioplastic to be 'sustainable'. And we take care from where we took the raw material we need to produce them.

A large and massive transition needs to happen in the way we create packaging, in the way we use packaging and in the way we collect it at the end of life-cycle .. the solution is not only one.

For have a significant change, we need to:

a) redesign our products, business models and systems to eliminate (or greatly reduce) the need for single-use packaging.

b) push for cross-industry and cross-sector collaboration — the only way to reduce the systemic challenges such as the lack of bioplastic or reducing the volume of plastic that arrive in the landfill.

c) boost up the recovering infrastructure, the composting facilities, and recycling bioplastics, as well as a better system to recollect the packaging at end of life for example oblige the big distribution to accept the used packaging from consumers, or better yet create reward systems for consumers that bring used packaging back to collection centres. In practice, wanting to copy the concept of emptiness from the past to make it so dear to my childhood when bringing a bottle back to the store you would receive back a small economic compensation.

All of these solutions (maybe plus some others) are possible, but all they have to happen hand-in-hand with the adoption of bioplastics, as only then will we begin to reduce in the level of plastic packaging waste being produced but mainly reduce the presence of plastic in the environment.