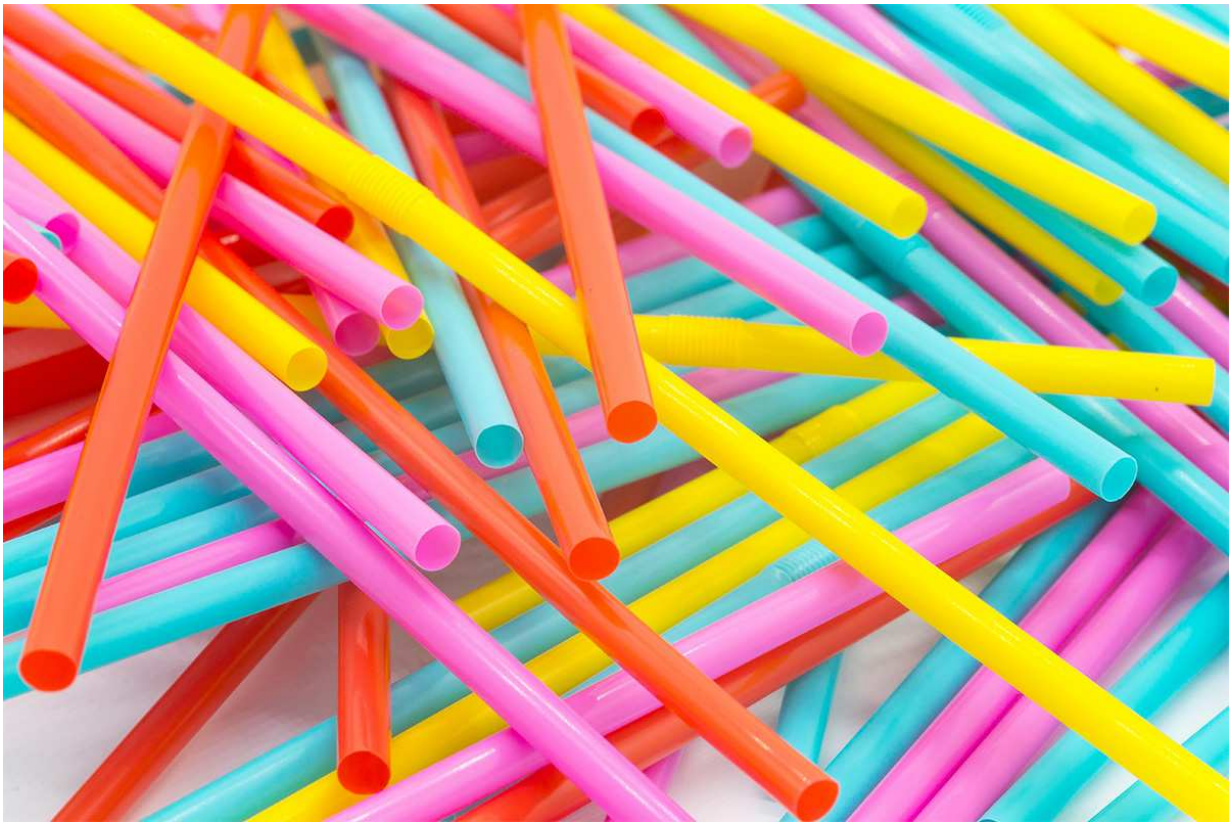
New Scientist

FEATURE 16 May 2018

Biodegradable plastic: Waste that eats itself

Plastics that degrade on disposal already exist, and are getting better. But they won't solve the plastic trash problem on their own – and here's why



Pretty wasteful: Single-use straws add to the plastic in our landfills

By **Aisling Irwin**

Can we simply magic plastics away? That's the promise of biodegradable plastics – and they are at least part of the plastic waste solution, says Kevin O'Connor of University College Dublin, Ireland.

Perhaps the best-known biodegradable plastic is polylactic acid, or PLA. Made from maize starch or sugar cane, it has uses ranging from medical implants to packaging. O'Connor is working on fermenting sugars or plant oils, or even breaking down waste PET, to make polyhydroxyalkanoates (PHAs), a family of plastics that can be used to make bottles, films and glues.

The most popular biodegradable plastic on the market is probably Mater-Bi, a thermoplastic starch made by the Italian company Novamont from sugar, plant oils and even thistles. The hope is that wood chips and other biomass waste could eventually be used as feedstocks for biodegradable plastics.

Read more: Fixing planet plastic – How we'll really solve our waste problem

Existing biodegradables generally need industrial conditions to break down, for example up to 12 weeks at 57°C for compostable plastics that decompose with food waste. Recycling firms don't like them, complaining that they further contaminate waste streams, while industrial food composters fear that people will get confused and put conventional plastic in food waste collection bins as well, rendering the resulting fertiliser worthless.

Biodegradable plastics that can rot unaided in a ditch or in landfill are harder to make. Possible sources include plant sugars and starches, and also seaweed, which doesn't need fresh water and fertiliser to grow. These plastics would probably decay to carbon dioxide (or, in landfill, more likely to methane), water and biomass after just one outing, to the distaste of circular-economy enthusiasts. The argument is that greenhouse gases emitted are "short cycle", already taken out of the atmosphere when the plant ingredients were grown. Making a tonne of plastic from some types of biomass absorbs the equivalent of 2.2 tonnes of CO_2, while making a tonne of fossil fuel-based plastic releases 1.8 tonnes.

Not all bioplastics – those derived from today's biomass, rather than yesterday's fossil fuels – are biodegradable. Coca-Cola's PlantBottle, for example, is around 30 per cent ethylene glycol that comes from plants, helping wean us off oil. But as it is chemically identical to conventional PET, it will stick around in the ocean for just as long if not disposed of properly.

No biodegradable plastic yet invented has the gas-barrier properties of PET, so any fizzy drink held in a container made from one would soon go flat.

Despite these problems, however, O'Connor calls the lack of take-up of biodegradables regressive: "It's a bit ironic that somebody in the recycling business says: 'Oh, they'll contaminate our recycling system, which is grossly inefficient and is not capturing even half of the plastic waste that is generated'. I say the system needs to change."

This article appeared in print under the headline "How to Solve a Problem Like Plastics"

Aisling Irwin is a freelance writer based in Oxfordshire, UK

Magazine issue 3178,
published 19 May 2018