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By NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY OCTOBER 25, 2020



Bio-based and biodegradable plastic is no safer than other plastic.

Bioplastics may be not produced from oil, but that's about the only benefit, researchers say.

Conventional plastic is made from oil. The production of plastic is not sustainable, and it can contain substances we know are dangerous if ingested.

In recent years, bioplastics have come onto the market as an alternative to conventional plastic. Bioplastic has some apparent advantages: it is usually made from recycled material or plant cellulose, it can be biodegradable – or both.

But a new study shows that it is not non-toxic.

Bioplastics are in fact just as toxic as other plastics, according to an article published in *Environment International*.

Bioplastics not safer

“Bio-based and biodegradable plastic are not any safer than other plastics,” says Lisa Zimmermann from Goethe Universität in Frankfurt. She is the lead author of the

recent article.

Zimmermann points out that products based on cellulose and starch contained the most chemicals. They also triggered stronger toxic reactions under laboratory conditions.

“Three out of four of these plastic products contain substances that we know are dangerous under laboratory conditions, the same as for conventional plastic,” says Martin Wagner, associate professor at NTNU’s Department of Biology.

Wagner is one of the collaborators for PlastX, a research group at the Institut für sozial-ökologische Forschung (ISOE) in Frankfurt.

This group has just led the work on the largest survey to date of chemicals in bioplastics and plastics made from plant-based materials.

Up to 20,000 different substances

In particular, the group has looked at toxic substances in these types of plastic. The substances can for example be directly toxic to cells in the laboratory, or they can act as hormones that in turn can disturb the body’s balance.

The study includes 43 different plastic products, including disposable cutlery, chocolate packaging paper, drink bottles and wine corks.

“Eighty percent of the products contained more than 1000 different chemicals. Some of them as many as 20 000 chemicals,” says Wagner.

General guidance impossible

It goes without saying that it is almost impossible to keep track of absolutely all the possible harmful effects of so many different materials.

Even seemingly similar products have their own special chemical composition. A plastic bag made of bio-polyethylene can contain completely different substances than a wine cork made of the same material.

“Making general statements about certain materials becomes almost impossible,” says Wagner.



People use an enormous amount of plastic, and it isn’t clear that bioplastic is a good alternative.



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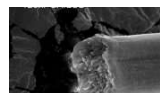
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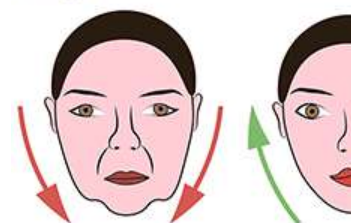
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We do not know to what extent the substances in plastic are transferred to us humans.

Other packaging not necessarily better

At present, the consequences this has for the environment and for people’s health are still uncertain. We don’t know to what extent the substances in plastic are transferable to humans.

Nor do we know whether the alternatives to bioplastics and conventional plastics are better for us and the environment around us, since so many factors come into play. The alternatives may involve polluting production methods and limited opportunities for recycling, or food production has to give way to obtain the materials for the alternative products. More research is needed.

Reference: “Are bioplastics and plant-based materials safer than conventional plastics? *In vitro* toxicity and chemical composition” by Lisa Zimmermann, Andrea Dombrowski, Carolin Völker and Martin Wagner, 17 September 2020, *Environment International*. DOI: [10.1016/j.envint.2020.106066](https://doi.org/10.1016/j.envint.2020.106066)

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