

Developing bioplastics

How far is the development of biodegradable and biobased plastics in food applications?
The EU project MyPack addresses these questions within a consortium of 18 European partners.

Summary

MyPack Project

The aim of the EU Horizon 2020 project is to promote the market of innovative packaging: less discarded food and less packaging waste are the declared targets. The project is funded with 4.5 Mio. € by the European Commission, the rest (1.5 Mio. €) comes from industrial partners. The University of Hohenheim, as one of the research partners, pursues in particular the further development of the raw material called PEF that is produced from plant residues [see VR 1/2019].

Marcus Götz [citation]: 'The MyPack project aims to initiate further, company-specific, projects'.

Among other industry partners, the French Organic food producer, Léa Nature, the producer and packer of freshly sliced salads Barba Stathis from Greece, and the German baby food producer Hipp participate in MyPack. Besides, several manufacturers of packaging and packaging materials are participating in the project, e.g. the Italian bioplastics manufacturer Novamont as well as the French supplier of PLA compounds NaturePlast. The FürstGroup, a German partner, is responsible for the processing of raw materials to trays and foils.

Susanne Braun, the Managing Director of the Research Center for Bioeconomy, her employee Dr. Dimitrios Argyropoulos, and Markus Götz, doctoral candidate in the research group of the Dept. of Conversion Technologies of Biobased Resources at the University of Hohenheim, explain the background.

Considering the current legislation around plastic packaging, one could think that the industry is already intensively taking care of the bioplastics development. Why is there a need for a European project?

Susanne Braun: As the food sector is operating on European and international level it makes sense to cooperate and work in a network. This way we are bringing together various research institutions, industry partners such as packaging manufacturers and end-users like Hipp from Germany.

Dimitrios Argyropoulos: This way also small companies from all over Europe can benefit from collaborative work with different countries.

Braun: Plastic waste is seen as an important issue by the European Commission that will be tackled in various research areas in the following years.

Among others, the MyPack project is focusing on solutions based on PLA. Why?

Götz: PLA is considered as state of the art. Other technologies such as coatings or the PEF exist only in an advanced research and developmental state. These materials are not yet produced in a tonnage suitable for the EU market.

Is PLA used for your research because it is already established and therefore has a bigger chance of success?

Braun: In a project like this, we cannot focus only on basic research but have to work on topics that are already advanced, to have applicable and presentable results in the end.

Götz: PLA is already known very well. This way we are taking advantage of a big knowledge and technology lead. On the other hand, this project is also an important platform for other technologies that we examine. In this way PEF has an easier market entry, since we have already shown patterns and presented the process with PLA. Data on PLA is already available; for other technologies like PEF this data has to be gathered first.

Are we talking about PLA applications as solid containers and films?

Götz: PLA is used for three product categories at Léa Nature, Hipp, and Barba Stathis. Hence, we have different implementations fitting for each of their food products.

Dimitrios Argyropoulos [citation]: *'In a European project, small companies can also benefit from newly developed technologies'.*

Susanne Braun [citation]: *'Our results will be best-practice applications for different packaging requirements'.*

Talking about PEF, which is investigated for MyPack in Hohenheim: is the produced amount sufficient to satisfy the great demand of the food industry?

Götz: It depends. Our partner AVA Biochem produces PEF from fructose. The company can already deliver large quantities that can be ordered as granules. We as a university with an agricultural background are focusing on the PEF production from agricultural or food industry residues.

For example, we could produce PEF trays for Hipp made from the carrot peels remaining from food production there. It works. The only thing needed is sugar-like molecules, i.e. carbohydrates. Currently, however, there is no such project planned. Looking at the PET market to be replaced with PEF, the quantities needed are available.

Is there a preliminary result you can give us on the material properties of PEF?

Götz: We have made progress on the gas permeability and sealing properties of PEF and compared that to other multi- or monolayer plastics. Also, the recyclability was already examined according to a standardized protocol. If the recyclate is planned to get in contact with food, this has to be investigated separately. But this is not foreseen in MyPack. We are only evaluating this theoretically, up to an end-of-life solution, whatever that will look like. The carbon footprint is about 50-70% lower than for PET.

Do you already have an industrial partner that processes PEF into a packaging material?

Götz: The Fürst Group is currently testing the raw granules on their machines; without additives and not yet refined to a base material.

Léa Nature produces organic products: Isn't it irrelevant for the project whether an organic biscuit or a conventional biscuit is packaged?

Braun: A company that produces organic products normally has higher standards. And consumers of these products are also increasingly demanding that organic food products are offered in organic packaging. That is why companies from the organic sector are even more interested in being active here.

Argyropoulos: One work package of the project therefore also covers consumer behavior.

Can the industry already benefit from the results?

Götz: Of course, those who are interested in the project are welcome to contact the MyPack coordinators to get further information. An EU-project with many partners typically serves as platform, from which questions for smaller projects could be derived, also from industry. The EU even wishes that we arouse interest and take up these questions in individual projects. Especially as universities typically do not bring the products to the market.

How will the outcome of the project look like?

Götz: The project partners will summarize the aspects of the investigated packaging variants: product shelf life, humidity, temperature resistance, footprint, oxygen, costs, user acceptance, legal issues of different markets, end-of-life solutions, food properties, etc. This will be summarized in a kind of matrix.

Argyropoulos: From this, the food manufacturers can derive information on the use of bioplastics for their products.

Braun: The companies will decide whether they pursue the technologies or not. Typically for an EU project, the content is public. Many stakeholders can benefit from it: film and packaging manufacturers, food producers and also consumers.

Challenge: The consumer decides

Whether or not the project is successful is also depending on the consumer. There is not automatically a high demand for compostable or biodegradable packaging. MyPack researchers say that many consumer studies have shown indeed a high level of consumer acceptance of such packaging solutions. But when it comes to the purchase decision, usually only the price is taken into consideration. According to studies the willingness to pay more for environmentally friendly packaging also depends on attitude, consumption habits and the appreciation for food.