Longer shelf life with smarter film

A new packaging film that adapts to changing temperatures has been developed in Wageningen. Fruit and vegetables packed in it stay fresh for longer.

TEXT PAUL DE JAGER **PHOTO** SHUTTERSTOCK

It was a stroke of luck. Eelke Westra's colleagues at Wageningen Food & Biobased Research were working on a film with high barrier properties, but when tested, the material they had developed proved as leaky as a sieve. 'We were extremely happy about that. We saw application potential as packaging film and we carried on developing the idea,' says Westra, Post-Harvest Quality programme manager. 'Step by step, we arrived at a new dynamic packaging material that is highly suitable for the packaging of fruit and vegetables in a modified atmosphere.'

Fruit and vegetables are made up of living cells which absorb oxygen and emit CO_2, explains Westra. 'If the products are packed in airtight material, the oxygen runs out and the CO_2 level goes up. Then the cells can't absorb any more oxygen to generate energy with, and they die off.'

However, respiration in fruit and vegetables depends on the ambient temperature. The rate increases at higher temperatures, and goes down at colder ones. And the new film reacts to this, adjusting its permeability to gases depending how long the product has been in the fridge or at room temperature. As a result, the packaged product stays fresh for longer.

OPTIMAL CONCENTRATIONS

'We aim at an optimal gas concentration in the packet for keeping the product fresh,' explains Westra. Under cold conditions, the film remains closed and the product is kept at the right gas concentrations. In warmer conditions, the permeability to gases increases so that the oxygen that is needed can go in and the CO_2 that is produced can go out.

The new material is a thermoplastic polymer made up of a polymer that keeps the material flexible and strong and a polymer that regulates the gas permeability. 'As far as we know, that is unique,' says Westra. 'There is no existing material with these properties. So we think we stand a good chance of obtaining a patent and of developing future applications.'

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SLOWING DOWN DECAY

In the food supply chain, much effort goes into keeping temperatures consistently low, to slow down decay. This is not entirely successful. Fruit and vegetables can be exposed to higher temperatures in transit, and even in the shop. As an example, strawberries might be displayed somewhere prominent but outside the chilled section to stimulate impulse buying.

Fresh products are exposed to temperature fluctuations after purchase too. A shopping

bag can get very hot on a summer's day. And at home, consumers do not always store food in the best place. The new packaging material adapts to this, extending the shelf life of fruit and vegetables and thus preventing food waste.

The new packaging material has the biggest effect on products with high respiration rates such as strawberries and mushrooms. 'Those products benefit from a regulated composition of the atmosphere, but currently they cannot be packed in film because that will make the gas conditions deteriorate quickly. Packed in our new film, though, the products keep the right gas concentrations, which lengthens their shelf life.'

This packaging has already been tested on pears and mushrooms. The pears remained firm, which is considered a quality yardstick. At this stage, the research on mushrooms mainly focused on the permeability properties of the film. The research results were promising enough to start exploring commercial applications. 'We are now talking to producers of packaging material. They see a market for this. The cost price will not be a limiting factor,' thinks Westra. 'The raw materials are no more expensive and the manufacturing process is well-known.'

REPLACING THE FOSSIL COMPONENT

Westra does have some reservations about this innovation. The new packaging material has a fossil component and a component made out of starch, which is biodegradable. 'We don't have to just accept the amount of fossil material used,' believes Westra, 'We can carry on working towards replacing that component with biobased material as much as possible. That's what we're here for as a research institute.'

But no matter how biobased it becomes, it will still be packaging, notes Westra. 'After use, it is waste, and we want as little waste as possible. And yet we do need to use it, as it has a protective function, which extends the shelf life of products. The packaging can be used for communication too. You can put a sticker on it with product information and a barcode. And the ecological footprint of the plastics used is considerably smaller than that of food that is needlessly thrown out.' ■

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