Researcher develops food packaging with antioxidant derived from grape skins and seeds

Geovana Benites / 19 de janeiro de 2024

Sustainability | In addition to making use of residues from the wine industry, the packaging is more efficient protecting against food oxidation

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One of the main elements in the commerce of goods are the packages in which food is wrapped. Good packaging ensures quality preservation, protecting food against external conditions and facilitating the transportation, storage, and distribution.

With that in mind, researcher Vanessa Machado Babinski Ramos has developed an active packaging made of low-density polyethylene (LDPE) obtained from natural antioxidants extracted from agro-industrial wine residues, mainly from grape skins and seeds. Under the supervision of Professor Ruth Marlene Campomanes Santana, the thesis, presented to the Mining, Metallurgy, and Materials Engineering Graduate Program at UFRGS, revealed that the addition of natural wine antioxidant extract to the manufacturing of active packaging contributes to improve the performance of the material when compared to the use of synthetic antioxidants.

Antioxidant active packaging is made with bioactive components that release substances into the packaged food. So, in addition to functioning as a barrier between the food and the atmosphere, these packages contain compounds that delay the oxidation and extend product shelf-life. “Active packaging interacts with the environment and ends up providing a longer period of suitable consumption to the product,” explains Vanessa.

In this process, the antioxidants are commonly applied directly in food products. However, according to Vanessa’s study, the use of active packaging is growing due to uncertainties regarding the use of synthetic antioxidants and the potential toxicological effects of these compounds.

> *“Usually, these antioxidant additives are applied directly in the food. For example, antioxidants are added to cooking oil in order to prevent food oxidation. The goal of the active packaging is to reduce the amount of antioxidant synthetic agents added to food”*
>
> — Vanessa Machado Babinski Ramos

From the wine industry to the shelves

In her research, Vanessa developed and tested a type of packaging using LDPE with natural antioxidants derived from the extract of agro-industrial wine residues, mainly grape seeds and skins, byproducts with high antioxidant activity. “Grape skins and pomace are large-scale residues which lack proper recycling,” Vanessa emphasizes.

For the development of the study, the antioxidant was extracted with the help of other researchers and professors from the Institute of Science and Food Technology at UFRGS. Afterwards, Vanessa added the extract to the polyethylene by employing a technique called extrusion, which incorporates and blends the active agent to the polymer heating the mixture to high temperatures.

In order to evaluate the influence of the packaging on food durability, Vanessa conducted tests using sunflower oil. She stored the oil in three recipients: one developed through the research with natural antioxidants, another with synthetic antioxidants, and a third one with only conventional polyethylene. As a result, the researcher found that the oil stored in the packaging made of natural antioxidants was preserved for a longer period compared to the oil in the other recipients.

Furthermore, the packaging with the grape extract exhibited a peculiar coloration due to the grape skins used, which ended up creating a light barrier, contributing to the extension of the preservation period of the food. “Light is one of the properties that influences food oxidation, so the color of the packaging provided an additional barrier. Conventional polyethylene packaging is colorless, but our packaging had coloration, which helped inhibit the passage of light to the food and delayed oxidation,” she explains.

Considering further research, Vanessa sees potential in studies which may seek to analyze different concentrations and applications of both the natural and the synthetic antioxidants. Another possibility would be comparing both compounds in different concentrations, since the dissertation regarded only a specific concentration of these antioxidants in each formulation.

The scientist also emphasizes that future research could analyze other residues with high antioxidant potential, such as barley (residue from the beer manufacturing process) and blueberry peels. “There is an enormous range of residues that could be analyzed for extraction, including comparisons with other residues. That type of research would be promising,” she adds.

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Translated into English by **Enzo Sezar de Assis**, undergraduate student enrolled in the course “Supervised Translation Training I (English)” of the Undergraduate Program in Language and Literature, under the supervision and translation revision of Professor Elizamari R. Becker (P.h.D.) – IL/UFRGS.

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:: Read in Portuguese
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