Practice abstract 3

Innovative quality analyses and sustainable packaging for fresh fruit and vegetable snacks

Problem

Variability in breathing characteristics of fresh-cut products affects their shelf life without adjustable conditioning. Adapting conditioning methods, like adjusting headspace composition and micro perforation density, is crucial but challenging for optimal preservation. Research on characterizing and conditioning under industrial conditions, especially for complex ripening mechanisms in product mixtures, is lacking. Simple, flexible, and mobile systems are needed for characterization and conditioning. Furthermore, establishing the relationship between individual fruit and vegetable characteristics and packaging material gas permeability is a preservation challenge for product mixtures.

Solution

Development of a sustainable packaging system for fresh fruits and vegetables snacks. The system adapts to the quality of raw materials, using minimal processing and small-scale packaging units. The secondary packaging is made of a new biocomposite with recycled cork. The quality of fresh fruits and vegetables and new sustainable packaging systems (primary and secondary) for the preservation and distribution of fresh fruit and vegetable snacks that are produced are analyzed and packed in small-scale and mobile units.

Benefits

Benefits of primary packaging:

- Designed to be compostable by using PLA.
- Incorporating rPET from post-consumer trays (50%).
- Optimizing the quantity of material used for producing the trays.
- Using a recyclable material for the tray (PET) and the lid (PO).

Benefits of secondary packaging:

- Incorporating recycled post-consumer cork.
- Designing for being reusable.
- Designing for being recyclable or compostable (at the end of the life product).
- Designing using materials from renewable sources.

Practical recommendations *General recommendations*

Prioritize thoughtful fruit and vegetable selection based on regional varieties, seasonality, and consumer preferences to cater to your target market's specific tastes.

Pay attention to the quality of raw materials, making sure that they are not damaged and have the appropriate level of maturity.

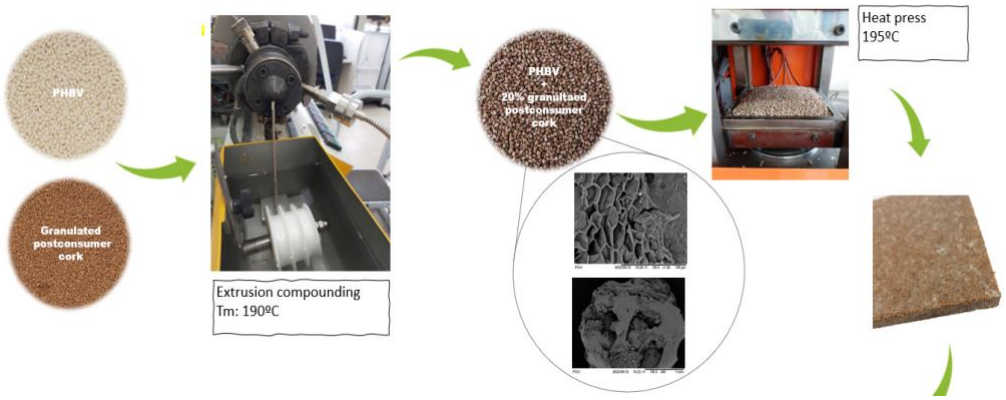
Primary packaging

In the case of bags, the use of coatings derived from natural extracts demonstrates good compatibility with PLA, which is commonly utilized in bag manufacturing. Moreover, it is crucial to establish the ideal theoretical microperforation level for various product combinations in order to guarantee optimal performance and the preservation of the bag's contents.

In the case of trays and bowls, four designs were defined, and a significant breakthrough was achieved by producing a preseries for each design using a rPET sheet containing 50% post-consumer recycled content derived from pots, tubs, and trays. This accomplishment marks a significant milestone in sustainability. Additionally, the necessary microperforation for the lids was determined for each product combination. Lastly, a commercial coating was selected to ensure reclosability for these packaging solutions.

Secondary packaging

The extrusion compounding process will also serve to validate the material's processability initially. The PHBV and granulated postconsumer cork in pellet form is introduced through the primary hopper, while the powder additive is incorporated through the secondary hopper. Within the secondary hopper, the polymer is melted. The resulting compound is obtained in pellet form, making it suitable for various processes such as injection molding. Twin-screw extruders, known for their superior mixing capabilities, enable efficient blending at lower melt temperatures.



The cork (alveolar part) was successfully incorporated into the PHBV material, showing no signs of adhesion problems. The pellets exhibited a uniform appearance, indicating successful incorporation. Analysis of SEM images further confirmed the robust adhesion between PHBV and cork, with minimal occurrence of cavities or holes that could impede the processing phase.

Further information

Videos

https://www.youtube.com/watch?v=DmgCApXSpHk&t=59s

Weblinks

https://www.fox-foodprocessinginabox.eu/foxlink-app/

About this practice abstract

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