

## Edible Coating for Improving Quality and Shelf Life of Fresh Fruits and Vegetables

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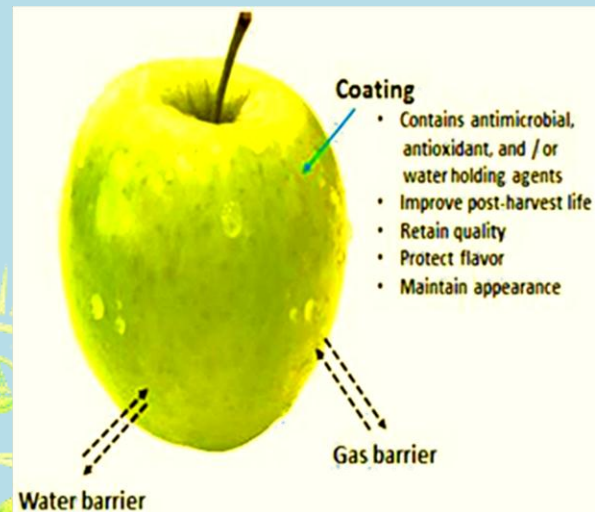
### Introduction:

In a world where food waste and quality maintenance are critical concerns, the utilization of innovative technologies to extend the shelf life of fresh fruits and vegetables has gained paramount importance. One such technology that has emerged as a promising solution is the application of edible coatings. These coatings offer a protective layer that not only enhances the visual appeal of the produce but also helps in preserving its freshness, flavor, and nutritional value. This article delves into the concept of edible coatings, their composition, application, benefits, and future prospects in revolutionizing the post-harvest industry.

### ➤ Understanding Edible Coatings

Edible coatings, also known as food coatings or film-forming agents, are a thin layer of edible materials applied to the surface of fresh fruits and vegetables. The primary purpose of these coatings is to create a barrier between the produce and the external environment, thereby slowing down the processes that lead to spoilage, such as

moisture loss, gas exchange, and microbial growth. These coatings are usually transparent or semi-transparent, allowing the natural appearance of the produce to remain visible.



### ➤ Composition of Edible Coatings

Edible coatings can be made from a variety of natural materials, each chosen for its specific properties and benefits. Common materials used in the formulation of these coatings include:

- 1) **Polysaccharides:** Substances like cellulose, chitosan, alginate, and starch are often used as the main components of edible coatings due to their film-forming properties.

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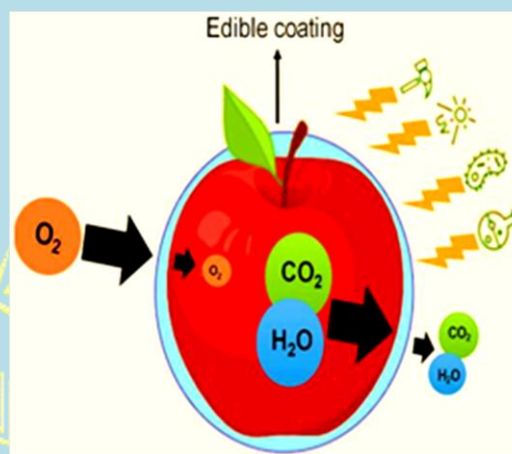
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- 2) These polysaccharides create a protective barrier, preventing moisture loss and maintaining the desired texture of the produce.
- 3) **Lipids:** Edible oils and waxes, such as beeswax and carnauba wax, can be incorporated into coatings to provide a hydrophobic layer that reduces water vapor transmission and helps retain moisture within the produce.
- 4) **Proteins:** Proteins like gelatin and casein can be utilized to create coatings that enhance the mechanical strength of the produce's skin, reducing physical damage during handling and transportation.
- 5) **Composites:** Some coatings are formulated by combining different materials to achieve a synergistic effect. For example, a blend of polysaccharides and lipids can offer both moisture retention and gas barrier properties.
- 6) **Natural Additives:** Bioactive compounds, such as antioxidants and antimicrobial agents, can be included in the coatings to provide additional benefits, such as extending shelf life and reducing microbial growth.

cleaning and drying the fruits or vegetables, followed by applying the coating solution through methods like dipping, spraying, or brushing. The coated produce is then allowed to dry before packaging. The thickness of the coating layer can be adjusted based on the specific requirements of the produce and the desired shelf-life extension.



### ➤ **Benefits of Edible Coatings**

The utilization of edible coatings offers overall improvement of the quality and shelf life of fresh fruits and vegetables:

- 1) **Extended Shelf Life:** Edible coatings act as a barrier against moisture loss, thus preventing the produce from wilting and maintaining its freshness for a longer duration.
- 2) **Reduced Microbial Growth:** Many edible coatings contain natural antimicrobial agents that inhibit the growth of bacteria and fungi, reducing the risk of spoilage.

### ➤ **Application of Edible Coatings**

The application of edible coatings is a relatively straightforward process. It involves

**3) Preserved Nutritional Value:** By minimizing exposure to oxygen and other external factors, edible coatings help retain the nutritional content of the produce, including vitamins, minerals, and antioxidants.

**4) Enhanced Appearance:** The coatings impart a glossy and attractive appearance to the produce, making them more visually appealing to consumers.

**5) Minimized Post-Harvest Losses:** With extended shelf life, there is a reduced likelihood of produce being discarded due to spoilage, contributing to lower post-harvest losses.

**6) Environmentally Friendly:** Edible coatings are often derived from natural materials, making them biodegradable and environmentally friendly compared to some synthetic packaging materials.

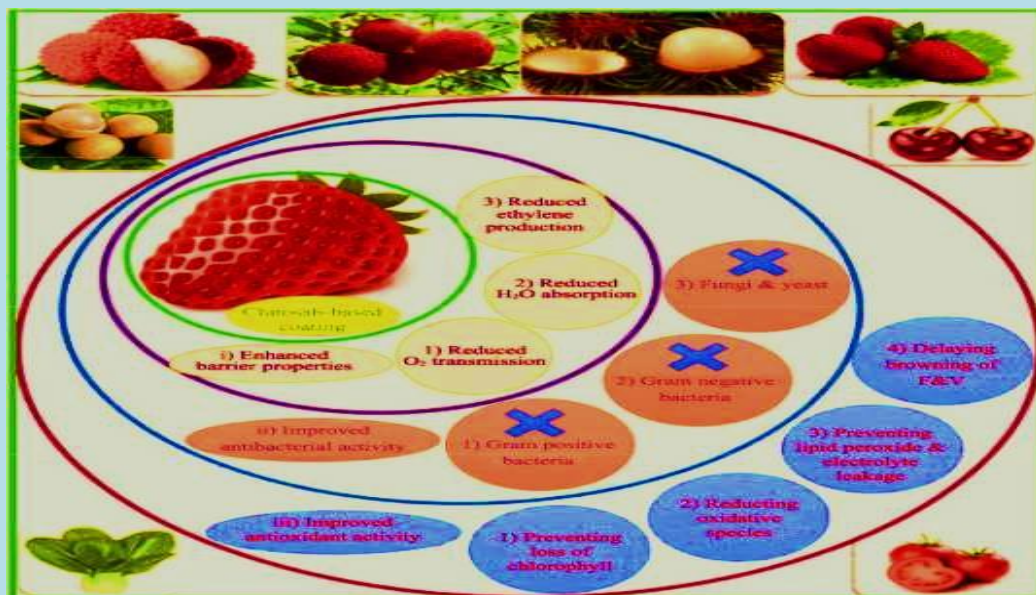
**7) Reduced Need for Synthetic Preservatives:** As edible coatings offer a natural way to extend shelf life, there is a decreased reliance on synthetic preservatives, aligning with consumer demands for cleaner label products.

### ➤ Challenges and Future Directions

While edible coatings hold immense promise, there are certain challenges that need to be addressed to ensure their widespread adoption:

**1) Uniform Application:** Achieving consistent and uniform application of coatings can be challenging, as variations in coating thickness can affect the overall effectiveness.

**2) Mechanical Properties:** Some coatings might lack the necessary mechanical strength to withstand handling and transportation, leading to cracks or peeling.



3) **Cost Considerations:** The production and application of edible coatings can be costlier than traditional methods, which might pose challenges for small-scale producers.

4) **Regulatory Approval:** The use of new materials in food applications requires regulatory approval to ensure safety for consumption.

### ➤ **Future path way**

In the future, research and innovation in the field of edible coatings are expected to address these challenges and unlock even more potential benefits. This could include the development of coatings with enhanced mechanical properties, improved application techniques, and tailored solutions for specific types of produce. As consumer preferences shift towards healthier and more sustainable options, edible coatings are likely to play a significant role in transforming the post-harvest industry.

### ➤ **Conclusion**

Edible coatings represent a groundbreaking solution for enhancing the quality and extending the shelf life of fresh fruits and vegetables. Through their protective barrier properties, these coatings effectively combat moisture loss, microbial growth, and other factors contributing to spoilage. While challenges such as uniform application and cost-effectiveness remain, the potential

benefits, including reduced food waste, improved nutritional retention, and enhanced appearance, make edible coatings a technology worth investing in.

As research continues to advance and new formulations are developed, edible coatings could revolutionize the way we approach post-harvest management. By harnessing the power of natural materials, edible coatings not only meet the demands of an environmentally conscious society but also pave the way for a future where fresh produce remains just as fresh on our plates as it was when harvested.