Review Manufacturing of Edible Wrapper

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Abstract:-

Edible films and coatings serve as thin protective layers applied to food products, offering crucial functions in preservation, distribution, and marketing. They safeguard against mechanical, physical, chemical, and microbial damage while enhancing shelf life, particularly for perishable items like fruits and vegetables. These materials are selected based on factors like cost, availability, flexibility, optical properties, gas barrier capabilities, water resistance, and sensory appeal. Recent advancements focus on exploring novel polymer compositions, including nanoparticle integration, to enhance their properties. Moreover, research trends emphasize applications such as reducing oil consumption in fried foods, incorporating bioactive compounds for added functionality, and extending the shelf life of perishable goods.

The manufacturing of edible wrappers presents an innovative solution to combat environmental pollution caused by traditional non-biodegradable packaging materials. By utilizing natural and edible

ingredients such as plant-based polymers, biodegradable proteins, glycerin, gelatin powder, gum acacia, and water, this process creates wrappers that are both eco-friendly and safe for consumption. Various techniques including extrusion, casting, and compression molding are employed to produce wrappers of diverse shapes and sizes. Additives may be incorporated to enhance properties like barrier performance and shelf-life stability. The manufacturing process involves mixing and heating the ingredients to form a malleable solution, which is then processed in a Continuous Stirred Tank Reactor (CSTR) to ensure uniform blending and gel formation. The resulting gel is spread onto trays and dehydrated in a tray dryer, where controlled temperature and airflow solidify the material. This approach offers promising opportunities for reducing plastic waste while providing a viable alternative for food packaging applications, supported by an efficient and scalable manufacturing process.

Introduction:-

Food packaging plays a pivotal role in modern food industries, contributing significantly to food preservation, transportation, and marketing. However, despite its importance, a substantial portion of food is lost annually due to various factors such as physicochemical changes, microbial spoilage, and improper storage during transportation. Traditional packaging methods, often non-biodegradable, exacerbate environmental pollution concerns and fail to address the growing consumer demand for sustainable solutions. In response, the development of edible films and coatings has emerged as a promising approach to enhance food quality, safety, and environmental sustainability.

Edible films and coatings offer several advantages over synthetic packaging materials. Notably, they can be consumed along with the food, eliminating the need for separate disposal and reducing waste. Furthermore, they provide a protective barrier against moisture loss, gas exchange, and aroma transmission while enhancing shelf life and preserving food quality. These edible packaging solutions are typically derived from renewable sources such as lipids, polysaccharides, resins, and proteins, aligning with the global trend towards sustainable practices.

Despite their potential benefits, challenges remain in the widespread adoption of edible packaging technologies. Tailoring these solutions to specific food products requires comprehensive research and development efforts to ensure efficacy, safety, and consumer

acceptance. Additionally, integrating edible packaging into existing food supply chains necessitates optimization and collaboration across various sectors.

This paper aims to explore the recent advancements, challenges, and opportunities in the field of edible packaging. It discusses the principles, applications, and potential impacts of edible films and coatings on food quality, safety, and sustainability. By examining current research trends and industry practices, this paper seeks to contribute to the understanding and advancement of edible packaging technologies in the context of modern food systems. In the quest for sustainability within the food industry, edible packaging emerges as a promising solution, aptly named for its dual purpose: it can either be consumed or efficiently biodegraded alongside the food it safeguards. Crafted predominantly from natural, plant-based materials like seaweed or casein, edible packaging encompasses a spectrum of forms – from films and sheets to layers and coatings – all intended to be ingested alongside the food product they encase.

This innovative approach to packaging addresses the pressing issue of waste generation, particularly pertinent in an era where the food industry faces scrutiny for its environmental footprint. Traditional packaging materials, often non-biodegradable and derived from non-renewable sources, contribute significantly to solid waste accumulation. In fact, data from the United States Environmental Protection Agency reveals that food and plastic constituted over 30% of solid waste in 2018 alone.

Against this backdrop, the advent of consumable food packaging offers a timely alternative, leveraging bio-materials and plant by-products to mitigate waste production. By embracing edible packaging, the food industry has the opportunity to transition towards a more eco-friendly paradigm, reducing reliance on plastics and minimizing environmental impact.

As we delve deeper into the realm of edible packaging, this paper explores its diverse types, materials, and implications for waste reduction in the food industry. From seaweed-based films to casein coatings, the array of options underscores the versatility and potential of edible packaging to transform the landscape of sustainable food packaging practices.

1. Literature survey

Da Silva et al. (2019) invent the Pectin, lemongrass essential oil and cellulose nanocrystals edible packaging for Strawberries.
Casein and clove bud essential oil packaging found the Archana et al. (2020) for Paneer.
The related studies and the summary and implications for the problem of the material used such as gelatin powder as component in making edible food or candy wrapper.
The corn syrup and combination of glycerin and corn syrup as component for edible candy wrapper this will conducted at brgy batuan, pototan, Iloilo starting June 2018 to nov 2019.
Leong and Yazdanifarad (2013), Ramos et al (2016), and souzaet al (2012) these studies reveal that gelatin has antimicrobial or antioxidant properties that improve the food packaging by making it flexible and elastic.

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Gelatin plastic has long been explored as a safer and more biodegradable product for food packaging. It is a more environmentally-friendly alternative to the plastic used today and could serve as a possible solution to the global plastic epidemic (Hanani et al., 2014).

2. Methodology

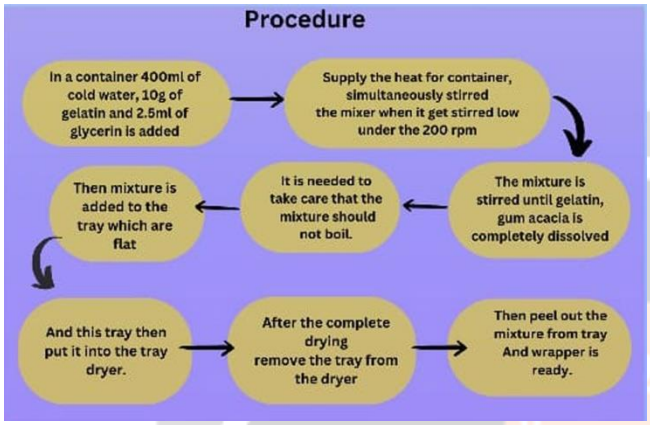


Fig: Types of Edible Packing

2.1 Material and Equipment

1. Water
2. Glycerin
3. Gelatine powder
4. Gum acacia

Equipment

1.CSTR
2.Tray dryer

2.2 Experimental setup:

Gelatin coatings are widely used for encapsulating low moisture food products or oil-based foods. It is also used for dietary supplements as it acts as a carrier of bioactive ingredients and oil, and also acts as a barrier against oxygen and moisture.

- In a container 400ml of cold water, 10g of gelatin 2.5ml and gum acacia 5gm of glycerin is added.
- Supply the heat for container, simultaneously mixture is stirred in the mixer when it get stirred there rpm of stirred is low under the 200 rpm
- The mixture is stirred until gelatin is completely dissolved and the liquid becomes clear or liquid get transparent to see.
- It is needed to take care that the mixture should not boil.
- Then mixture is added to the tray which are flat.
- And this tray then put it into the tray dryer.
- After the complete drying of material toothpick is inserted under edge of thin film and run around the edge to lift from the mold the material is carefully peeled of the mold.
- And our wrappers are ready.

3. Analysis

3.1 Ingredients and purpose

Gelatin and glycerin serve as crucial components offering encapsulation, a carrier of bioactive ingredients and oil and also acts as barrier against oxygen and moisture.

3.2 Mixing process

The controlled mixing process under low RPM (under 200) is essential to dissolve the gelatin thoroughly. This step ensures the

liquid becomes clear or transparent , indicating the completion of dissolution.

3.3 Temperature control

Its emphasized that the mixture should not boil , indicating need for precise temperature control . this is crucial to maintain the integrity of the gelatin and prevent undesirable changes in the mixture.

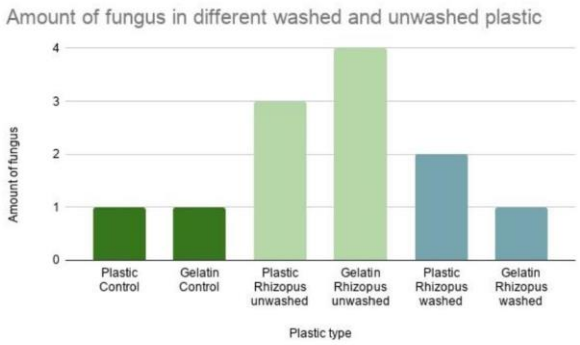
3.4 Tray drying

After mixing, the liquid is poured into flat trays and subjected to drying in a tray dryer. This step is critical for transforming the liquid mixture into a solid, film-like wrapper.

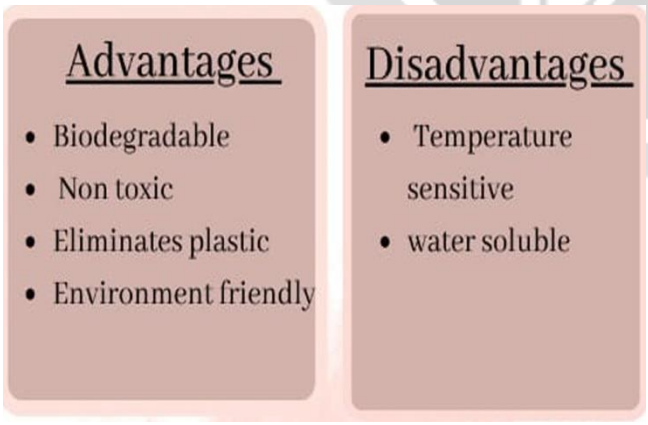
3.5 Wrapper Extraction:

Careful handling is required during the removal of the dried material from the tray. The use of a toothpick to lift the material around the edges ensures a successful extraction of the wrappers from the mold.

4. Economical Feasibility:



This chart illustrates the upper limit of the price consumers are willing to pay for our product. Utilizing this data, we can ascertain the proportion of potential buyers based on our estimated pricing. The higher the number of potential buyers, the greater the economic viability of our product. Furthermore, this chart aids in setting a target price, guiding our decisions on potential price adjustments.



Result

The project involved the manufacturing of edible wrappers, specifically focusing on a test sample named "Pale Yellow Color Edible Wrapper." The characteristics and test results of the wrapper are summarized as follows

Description

the wrapper exibit pale yellow colour

- **Solubility**: It is soluble in methanol, insoluble in acetone, and slightly soluble in water.
- **Moisture Content**: The wrapper contains a moisture content of 15.3518%.
- **Temperature Sensitivity**: The experiment assessed the degradation of the wrapper at different temperatures.
- **DISCUSSION**

The expected outcome was that samples exposed to temperatures between 15 to 17 degrees Celsius would exhibit the most significant degradation.

Edible Packaging Types

Edible packaging types encompass a diverse range of innovative options, each with its unique properties and applications:

Edible wrappers and containers: These are often made from ingredients like rice, seaweed, or edible plant materials. Edible containers and edible plastic wraps also add a unique flavor and texture to dishes. They are used for packaging sushi, rice balls, and takeaway foods. One drawback is that they can be less durable than traditional packaging and may require specific handling.

Edible gelatin capsules: Gelatin capsules are derived from animal collagen and have no odor or taste. They are commonly used for encapsulating pharmaceuticals and dietary supplements as they dissolve quickly, releasing their contents. Gelatin capsules are not suitable for all food products, and they may have limitations in terms of flavor retention.

Edible baking cups: Typically made from ingredients like wheat flour, these cups are designed to withstand baking temperatures. They are used for baking muffins, cupcakes, and other baked goods. Edible baking cups eliminate the need for disposable paper or plastic liners. While they add a delightful crunch to baked treats, they are not as versatile as other edible packaging types, as they can be used only for baking.

Conclusion

In conclusion, the endeavor to develop edible wrappers represents a pivotal step towards addressing the pressing environmental and health challenges posed by traditional plastic packaging. Through meticulous experimentation and analysis, this research has elucidated the key components, processes, and objectives essential for the successful creation of sustainable and efficient edible packaging solutions.

The utilization of gelatin-based materials, coupled with precise mixing, temperature control, and tray drying techniques, has shown promising results in producing high-quality edible wrappers. By focusing on factors such as taste, texture, and nutritional value, the research underscores the importance of not only environmental sustainability but also consumer satisfaction and safety.

The anticipated outcomes of this research extend beyond the realm of food packaging, encompassing broader societal and industry benefits. Edible packaging offers a pathway to reduce plastic pollution, mitigate environmental degradation, and promote a circular economy model. Furthermore, it safeguards food products, prolongs shelf life, and minimizes food waste, thus contributing to global efforts towards sustainable development.

As we navigate towards a future characterized by heightened environmental consciousness and a growing demand for sustainable alternatives, the significance of edible wrappers cannot be overstated. This research sets the stage for continued innovation and refinement in the field of edible packaging, inspiring collaboration across industries, academia, and policymakers to usher in a new era of responsible packaging practices.

In essence, the journey towards edible wrappers epitomizes a convergence of scientific ingenuity, environmental stewardship, and societal responsibility. By harnessing the potential of edible packaging, we pave the way for a greener, healthier, and more sustainable future for generations to come.

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