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EDIBLE WRAPPER: A SUSTAINABLE AND ECO-FRIENDLY APPROACH IN PACKAGING INDUSTRY

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ABSTRACT

In recent years, edible films or coatings have drawn a lot of interest. There are clear benefits over synthetic films for materials used in edible packaging, such as polysaccharide, lipid, and protein-based materials and their composites. It might help lower the pollution levels in the environment. The primary benefit of edible films over synthetic ones is their ability to prolong the shelf life of fresh goods while still being environmentally benign and safe to consume as a component of food products. When compared to more conventional, non-environmentally friendly packaging materials, edible films serve as barriers that could minimize complexity and increase the recyclability of packaging materials. They also have the potential to replace synthetic polymer films. This edible wrapper will be a revolution in packaging industry.

KEYWORDS

Edible wrapper, sustainability, food packaging, synthetic films, Eco- Friendly

1. INTRODUCTION

Food goods can have their shelf lives extended by using edible film or coatings, which can be eaten with the food. Using edible film is a major concern right now. Since the numerous losses connected to synthetic or plastic film packaging have the potential to harm the environment [1]. In addition to gaining traction in the scientific community, edible cinema has caught the interest of policymakers and environmentally conscious consumers [2]. Edible films are composed of readily soluble substances, particularly those that harbour microbes. They can be viewed as dynamic ecosystems that regulate the respiration gases (such as oxygen, carbon dioxide, and ethylene) that pass between food and the environment, minimizing or eliminating moisture and fragrance loss, or safeguarding against undesired microbes [3]. Edible film can be used to entirely cover food or to sandwich food ingredients together [4]. In contrast to plastic materials, biopolymers, proteins, lipids, or composites break down more quickly and easily when utilized to produce edible film [5]. Usually made of food-grade materials, the edible film is placed directly to the food's surface by coating or wrapping it [6–8]. In order to prevent fruits from losing their moisture, films have been employed to preserve food since the 12th century in China. One example of this is wax. Japan utilized the first edible film, derived from soy milk, sixteen centuries ago to preserve fruits and achieve a glossy finish [9, 10].

Among the several functions that edible film performs, its ability to provide physical protection [11] can be classed based on the materials that make up its constituent class. Lipids and hydrocolloids (proteins and polysaccharides) are the most commonly used materials. Polysaccharides, among other things, are the easiest to purchase and work better to make coatings or films. A film is more likely to form when there are a lot of hydrogen bonds and hydroxyl groups present. It is possible to identify differences in characteristics between films and coatings composed of negatively charged g um, such as carboxymethyl cellulose, pectin, or alginate [7]. Most of the animal proteins (gelatine, casein, whey protein, collagen, or egg albumin) employed in the edible film are derived from animals. But rice, corn, soybeans, wheat, cottonseed, peanuts, and other vegetable proteins are also suitable for a vegetarian diet and are favored. Using heat or pH changes to denaturize proteins, which is followed by novel intermolecular interactions that congregate peptide chains [12]. Because of its affinity for hydrophilic surfaces, this kind of film is most suited for meat products [13–15]. Because hydrocolloids, like polysaccharides, can form a cohesive film, lipids, like glycerol and palmitic acid, cannot, so they are mixed to provide the best possible water vapor barrier [16]. Probiotic microorganisms, organic acids [17], essential oils [18], plant extracts [19], compound antibacterial [20], biodegradable chitosan, which has antimicrobial and antioxidant action [21], and other additives can all be included into edible film to benefit food items. A variety of agricultural by-products can be used to make edible films. For example, peach peel mixed with hydroxypropyl methylcellulose (HPMC) as a binder and micro-cellulose / nanofiber (CMNF) as a filler can enhance tensile and elongation strength and decrease the transmission rate of water vapor [22]. Nutmeg flesh can also be used as a source of pectin when combined with tapioca and palmitic acid. Peach pulp

plasticization in the HPMC matrix is demonstrated by its increased permeability to moisture (from 0.9 to 5.6 g mm kPa−1 h−1 m−2) and extensibility (10 to 17%), but decreased mechanical resistance (67–2 MPa) and stiffness (1.8 GPa–18 MPa), which is enhanced by CMNF [23].

2. METHODOLOGY

2.1 *Time and Place*

The research was conducted at B.K Birla College of Arts, Science and Commerce in the department of Food Science and Nutraceuticals from November 2023

2.2 *Materials and Tools*

The materials used were vegetable gelatine which was extracted from red algae, vegetable glycerine, water, stirring rod, petri plate, butter paper, funnel, scissors, oven, thermometer, magnetic stirrer, heat plate.

2.3 *Preparation of Edible wrapper*

The edible wrapper was prepared using 10gms Gelatine along with 2.5gms of glycerine. These were mixed into 400 ml of water. Then the mixture was stirred and brought to boil on medium flame. After boiling the mixture was poured in small petri plates and left to dry for 2 days. After drying the wrappers were carefully removed. The edible wrapper was then used to wrap various candies.

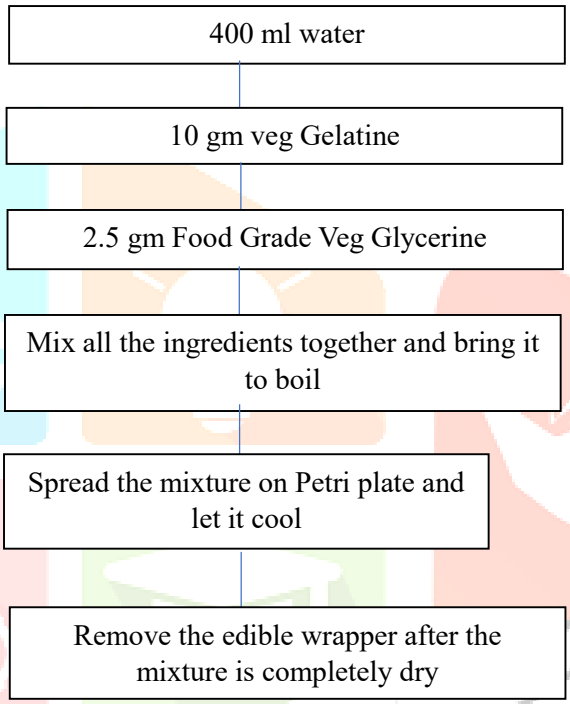

Figure 1.1: *Flowchart of the Preparation of Edible Wrapper*

Figure 1.2 **A**

Figure 1.3: *wrapping of candy*, **Figure: A, B, C** *Edible wrapper film*

3. RESULTS AND DISCUSSION

The kind and qualities of the material utilized have a significant impact on the final edible wrapper's characteristics. The gelatine used is protein which provides the tensile strength to the wrapper while the glycerine which is added provides the appropriate flexibility to the edible wrapper. The colour of the wrapper is clear and transparent which is due to the colourless gelatine and glycerine added to it. The thickness is measured to be 0.0678mm. The thickness, colour and tensile strength have no effect on the solubility of the wrapper. The wrapping of candy by edible wrapper is shown in figure 1.2 and figure 1.3

4. CONCLUSION

Edible film, as edible packaging in general, hasn't been able to fully replace conventional packaging, but it can be used in conjunction with secondary packaging to increase additional protection from the atmosphere, prevent contamination from microorganisms and foreign objects, and facilitate transportation in order to further improve the efficiency of food preservation.

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