POST HARVEST IMPLEMENTATION OF ALOEVERA GEL AND ORANGE PEEL POWDER BASED EDIBLE COATING FOR FRUITS AND VEGETABLES

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Introduction

Edible coatings are a thin layer of edible material that can be applied on the fresh or processed foods to provide a proper protection against moisture loss, gas exchange, and microbial growth. These coatings can be made up of variety of materials such as proteins, polysaccharides, lipids etc..They have improved significant attention in the food industry as an alternative to old packaging to synthetic packaging materials. They offer several benefits such as being biodegradable, renewable, and sustainable.Besides, they can improve the shelf-life, quality, and safety of food products.They can also enhance the sensory properties of food products by providing a lustrous, softness, and attractive appearance. Additionally, they can be used to deliver functional ingredients such as antioxidants, antimicrobials, and nutraceuticals.generally edible coatings have a lot of potential for improving the quality and safety of food products while decrease the environmental impact of traditional packaging materials.

The term "edible coating" has two main considerations. First part "edible" means, coaty may be consumed together with foods in contact so they need to cover all properties of safe-food ingredients according to Food and Drug Administration (FDA) having Generally Recognized As Safe (GRAS) . After that"coating" means, covering material should have packaging properties which secure the inner part from outer environment and limit gas and water vapor transportation between food material and outside. Generally, this material should not alter the appearance, smell, and taste of the product. Because of these quality concerns, coating material should be as thin as possible acquiring adequate mechanical properties to protect food material.

It have some advantages to use they are Shelf life extension: it can help to extend the shelf life of food by reducing the rate of moisture loss, which can slow down the decay of the product and reduce the spoilage.Improved food safety: Edible coatings can create a physical barrier that reduce microorganisms from addition the food, reducing the risk of contamination and spoilage.Improved appearance: it can enhance the aspects of food products by creating a smooth, glossy surface that enhances their visual appeal.Enhanced texture: coating can help to maintain the texture of food products by preventing them from becoming dry or moist. Lower use of preservatives: Edible coatings can help to lesser the need for chemical preservatives by providing a natural barrier that helps to keep food fresh.generally the edible coatings are an important tool in the food industry for improving the grade , protection, and shelf life of food products

New Trends on edible coating

(Amalia caraban Mitelut et,al..,) The development of new edible coatings with improved functionality and performance for fresh and minimally processed fruits is one of the challenges of the post harvest industry. In the past few years, research efforts have focused on the design of new eco-friendly coatings based on biodegradable polymers, which not only reduce the requirements of packaging but also lead to the conversion of by-products of the food industry into value added film-forming components. This work

reviews the different coating formulations and applications available at present, as well as the main results of the most recent investigations carried out on the topic. Traditionally, edible coatings have been used as a barrier to minimize water loss and delay the natural senescence of coated fruits through selective permeability to gases. However, the new generation of edible coatings is being especially designed to allow the incorporation and/or controlled release of antioxidants, vitamins, nutraceuticals, and natural antimicrobial agents by means of the application of promising technologies such as Nano encapsulation and the layer-by-layer assembly

METHODOLOGY

3.1 selection of materials
3.2processing of ingredients
processing of Aloe vera
processing of orange peel
Formulation of edible coating
preparation of coating mixture
Application of edible coating
sensory evaluation of edible coating
physicochemical analysis
weight loss
Total soluble solids
pH 3.7proximate analysis
3.7.1moisture content
3.7.2Ash content
3.7.3protein analysis
3.7.4carbohydrate analysis
3.7.5Crude fibre
3.Shelf-life

The study was conducted at Nehru arts and science college coimbatore. Collection of raw materials, preparation of ingredients, mixing the ingredients and preparation of the Edible coating, were the major steps.

Ingredients like Aloe vera, orange were collected from local market, palakkad. The methodologyadopted is discussed below.

SELECTION OF INGREDIENTS

Plant-based edible coatings are thin layers of natural substances that are applied to the surface of fresh or minimally processed fruits, vegetables, and other food products to extend their shelf life, enhance their appearance, and preserve their quality**.** Aloe vera gel can be used as an edible coating for fresh produce to extend its shelf life and improve its appearance. The selection of ingredients to be used in the formulation of the edible coating depends on several factors, including the type of produce being coated, the intended shelf life, and the desired sensory attributes.. Due to its natural and functional properties, aloe vera gel has gained interest as an edible coating for fruits and vegetables.

Aloe vera gel has been shown to be an effective ingredient in edible coatings due to its natural properties. Edible coatings are a thin layer of edible material applied to food products to enhance their shelf life,

texture, appearance, and nutritional value.Aloe vera gel contains a variety of vitamins, minerals, and antioxidants that make it beneficial as an edible coating. The gel is rich in vitamin C, which acts as a natural preservative, helping to extend the shelf life of coated products. Additionally, the gel contains enzymes that have been shown to have antimicrobial properties, making it effective against certain bacteria and fungi that can cause spoilage,

Orange peel powder Orange peel powder is another ingredient that can be used in edible coatings. Orange peel is rich in antioxidants and contains a high amount of vitamin C, making it a beneficial addition to food products. Here are some reasons why orange peel powder can be good for edible coating.Orange peelpowder is often used as an edible coating due to its natural antimicrobial and antioxidant properties. The powder is made from orange peels, which contain high levels of compounds such as limonene, hesperidin, and flavonoids that can inhibit the growth of microorganisms and slow down the oxidative processes thatlead to spoilage.

PROCESSING OF INGREDIENTS

Processing of Aloe vera gel

The Aloe Vera is collected from the Home itself.Harvesting: The first step in processing Aloe vera gel is to harvest the leaves from the plant. A mature Aloe vera plant typically has around 12-15 leaves, and the leaves should be at least 4-5 inches long before harvesting.Washing: Once the leaves have been harvested, they need to be washed thoroughly to remove any dirt or debris. Use a clean, sharp knife to cut off the thorny edges of the leaves, and then rinse them in cold water.Filleting: After washing, the leaves need to be filleted to extract the gel. Lay the leaf flat on a clean cutting board, and use a sharp knife to cut away the green outer layer, leaving behind the clear gel inside. Be careful not to cut into the gel, as this can cause it to become contaminated.Straining: Once you have extracted the gel, it is a good idea to strain it through a fine mesh sieve to remove any remaining bits of leaf or pulp.Storing.The Aloe vera gel can be stored in a clean glass jar or container in the refrigerator for up to a week. Alternatively, it can be frozen for longer-term stoage.It is important to note that Aloe vera gel should be used with caution, as it can cause skin irritation or allergic reactions in some people. It is always best to test a small area of skin before using Aloe vera gel topically or ingesting it.The figure 1 give the processing of Aloe vera gel.

Harvest mature Aloe vera leaves → Wash leaves thoroughly → Remove outer layer of leaves → Extract gel from inner layer using a sterile knife or spoon → Strain gel to remove any debris or impurities → Package and label → Store in a cool, dry place

Figure 1 : processing of Aloe vera gel

processing of Orange peel powder

Orange is collected from the local market.Wash the oranges thoroughly and peel off the skin.Cut the peels into small pieces and spread them out on a tray.Leave the peels to dry in the sun for a few days until they become brittle.Once the peels are completely dry, grind them into a fine powder using a blender or a food processor.Store the orange peel powder in an airtight container.

Formulation of edible coating

The processed ingredients were choosen in different variations as given below to formulate.

The variations are Sample A, sample B, sample c

Table 1

Sample	Aloe vera gel	Orange peel powder
A	55%	45%
B	50%	50%
C	40%	60%

From that we have choosen A as a final Edible coating mixture

Preparation of edible coating

The uprooted gel is crushed in a Domestic blender. Further homogenization of amalgamated .Gel using a homogenizer 1000rpm has also been reported. The Admixture is also filtered to remove contaminations, pasteurized, cooled. Boil the water and off the gas add some orange peel greasepaint into and mix well and cooled. Stabilized with ascorbic or citric acid. Add glycerine to it for thickening agent. The set gel excerpt is stored at cooled Temperature.

Sensory evaluation

Organoleptic evaluation of prepared Edible coating was undertaken by the students of food science and nutrition Department. The sensory attributes such as appearance, color, taste, texture and overall acceptability were evaluated using hedonic scale

Table 2

Excellent	5
Very good.	4
Good.	3
Fair.	2
Poor.	1

Physiochemical properties

Weight loss

The weight loss was measured every threeDays with a two-decimal precision digital scale (Gibertini,Italy).

+e value was expressed as a relative percentage and Calculated as weight loss (%) $(Wi - Wt)/Wi * 100$ (where Wi is the initial weight and Wt is the weight measured During storage).

Total soluble solids

Thee total soluble solid Content (°Brix) was estimated by a digital optical refractometer ATAGO (Atago Co., Ltd, Tokyo, Japa)

PH

The Ph of the given sample is measured according to the AOAC method using pen type Ph meter. The pH meter was calibrated with water of pH 7.01 and phosphate buffer. The Sample were taken from refrigerator and it was kept in room temperature. And the pH meter was dipped in the sample. There consecutive readings were taken after an interval of 60s and the value were noted.

Proximate analysis

moisture content Is measured by measuring the weight of the sample before and after the removal of water by evaporation.

% of moisture = $(W1- W2)/(W1 – W) \times 100$

W = weight of the crucible
W1 = weight of the crucible sample
W2 = weight of the crucible sample after drying

MEAN SENSORY ANALYSIS OF SELECTED SAMPLE

3 variations of edible coating was prepared. The prepared edible coating was then sensory evaluated by 20 panelist. Overall acceptability of the 3 variations such as A,B,C are 4.6±0.26,4.4±0.13,4.5±0.1Table 2 will shows the sensory evaluation of edible coating.

Table 3 result of sensory evaluation

Sample analysed	Taste	Appearance	Colour	Flavour	Texture	Overall acceptability
A	4.5±0.22	4.6±0.33	4.6±0.16	4.4±0.16	4.6±0.21	4.6±0.26
B	4.3±0.23	4.4±016	4.3±0.13	4.4±015	4.4±012	4.4±0.13
C	4.5±0.12	4.4±0.23	4.6±0.26	4.5±0.16	4.5±0.31	4.5±0.1

From this we can finalize the sample A from the **Table.3**

TOTAL SOLUBLE SOLIDS Table.5
will shows Total soluble solids

Sample	TSS value (°Brix)
A	20.33 ± 0.12
B	17.13 ± 0.06
C	18.87 ± 0.12

Table 5 will shows the results of Total soluble solids edible coatings are often used to improve the quality and shelf life of fruits and vegetables with a high TSS value, such as apples, oranges, and grapes, which typically have a TSS range of 5-30% Gorjian, S et al,..(2015).

PH

Table 6

Sample	PH
A	3.97 ± 0.00
B	3.49 ± 0.01
C	3.53 0.02

The Ph value obtained from the work is around 3.97.these is almost the same range with those reported by Guzman-Maldonado et al. (2014) noted that the ph of plant based edible coating range between 4.5 to 5.0.

PROXIMATE ANALYSIS

MOISTURE CONTENT

Table 7

Sample	Moisture
A	4.73±0.023
B	3.98±0.014
C	4.26±0.017

SUMMARY AND CONCLUSION

Edible coatings are an emerging technology in the food industry that can help to extend the shelf life of fresh produce and enhance their quality. In recent years, there has been increasing interest in using natural ingredients such as aloe vera gel and orange peel powder as edible coatings.Aloe vera gel is a natural polymer that contains bioactive compounds with antimicrobial and antioxidant properties. Orange peel powder, on the other hand, is a rich source of flavonoids and other phenolic compounds that have antioxidant and antibacterial properties.Several studies have investigated the use of aloe vera gel and orange peel powder as edible coatings for various fruits and vegetables.

Aloe vera gel has been reported to have wound healing and anti-inflammatory effects, while orange peel powder can help to lower cholesterol and bloodsugar levels.The application of edible coatings is a simple and cost-effective process that involves dipping or spraying the produce with the coating solution. The effectiveness of the coating depends on several factors such as the concentration and viscosity of the coating solution, the type and ripeness of the produce, and the storage conditions.In conclusion, the use of aloe vera gel and orange peel powder asedible coatings is a promising approach to enhance the shelf life and quality of fresh produce. This technology can contribute to reducing food waste and improving food security, which are important global challenges. Further research is needed to explore the potential of edible coatings and to optimize their formulation and application