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Role of Exopolysaccharides from Microorganism and Its Application on Orange

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Review Article

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ABSTRACT

The Citrus sinensis (sweet orange) belongs to citrus family (Rutaceae), which includes other fruits such as bitter orange, limes, lemons and grapefruits. It originated from Asia and it is eaten worldwide as a potential source of Ascorbic acid, a potent god-made stabilizer that strengthens immunity. Key phyto-chemicals like pectin, oxedrine, polyhydroxyphenols, and decent amount of folic acid, thiamine, potassium, nicotinic acid and magnesium are also present. These constituents being biologically active prevent diseases like coronary artery disease, tumour, renal calculus, peptic ulcers and low cholesterin and high blood pressure that enhances good well-being. Oranges are non-perishable and can last upto few weeks if stored in proper and suitable conditions. Among the components that find their uses in food packing, polymers have acquired a large area due to their varied performance and good execution. On the other hand, the main biopolymers used for food packing are extracted from finite resources and are not compostable or degradable, symbolises worldwide territory issue. Bio-decomposable films for sour fruits that can displace the presently used polyethylene-based waxes are of keen knowledge. CMC, among the examined biomoleculess provided mandarins with the modest metabolic loss, finest firmness, and shine; on the other hand not changing the universal taste and the breathing process.

INTRODUCTION

Fruits are easily prone to deterioration as they contain around 80-90% water content. When left out of the cuticle, water begins to evaporate rapidly, leading to a reduction in shelf life. Main loss in qualitative and quantitative attributes of fresh vegetables and fruits occurs in between the time of harvest and utilization. After harvesting of fruits, there is a modification in the gas balance amidst the oxygen utilized and the assembly of carbon dioxide. In this new condition, there is no cells regeneration and the gas transfer rate increases, leading to weight loss and taking to gradual progression and eventual ripening.

Oranges are affluent wellspring of ascorbic acid which is a strong solvent and useful for preventing cough and, cold, flavonoids, phenolic compounds. A single orange can provide up to 116% of RDA of vitamin C.
Traditional food packaging systems are contemplated as elementary vessels or containers to deliver food-products from the production area to the retailer and to the consumer without the modification of nutritious and sensory attributes of food [1]. However, these packaging methods many times are unable to enhance the shelf span of raw and fresh foods that lead to problems for manufacturers, customers and retailers.

As the basic purpose of food packing is safeguarding food from any extrinsic contaminants, many more functions like slowing of worsening, increase in table-life, safety with effects of transportation and preservation of the food attributes should be considered. Wrapping things should safeguard product from influence of surrounding conditions such as temperature, humidity, gases, and enzymes, loss of odour and bad aromatic elements, and attacks by microbes as well as macro-organisms. In addition, the international merchandise is attracting more demands and is constantly in seek of new and viable products, which at the same time can preserve the native characteristics of food. The insistence for novel wrapping and coating materials and eatables coating capabilities is rising.

LITERATURE REVIEW

In short, use of biopolymers procured through finite sources and non-degradable materials in covering area reflects a vital habitat effect and issue of waste production. At present, landfill is the most used technique of packaging waste scrapping, traced by recycling, composting and incineration. Although techniques of recovery such as recycling, reusing, reducing and/or composting are promoted as waste disposal measures, there is lot of things to be done to significantly lower the number of plastics in Municipal Solid Waste.
Citrus fruits are susceptible to anatomical and microbiological deterioration after harvesting. An effective method to enhance their outer covering life is to involve the use of opaque, straight film covering on the fruit's peel covering. The covering lowers loss of water and depreciation and enhances the look of the fruit by providing lustre [2]. In today world saleable cultivated citrus fruits undergo through a procedure in the packaging field. The coatings used are mostly developed on oxidised substances.

Decomposable bio-films for bitter ovaries that can cut-out the presently used polyethene-based insulates are of keen heed. HPMC (Hydroxypropyl methylcellulose), CMC (Carboxymethyl cellulose), Methylcellulose (MC), CH (Chitosan) films were tested with delicate fruit models: Tangerine.

Amid tested disaccharide CMC gave tangerines with the unpretentious decrease in weight, finest firmness and adequate lustre; not altering native taste and the respiration process. For improving effectiveness of coating, certain chemicals like glycerine were added. After that method of LbL (layer by layer) was used. LbL films, developed from a mixture of two disaccharides, Carboxymethyl cellulose (CMC) as an intrinsic covering and extrinsic layer of chicol, provided excellent execution. Distinct values of CH (chitosan) were tested. The Layer by Layer (LbL) films significantly enhanced all identified parameters for fruit quality, manifesting that edible coatings that are polysaccharide-based may contribute to a substitute to synthetic waxes.

While the stoutness of packing materials during the storage span of food is a boon, it changes inside a bane when the package gets into the after-use period. Polysaccharides are attaining place as ingenious packaging equipments by their omnipresent existence in environment, also due to their less price compared to other biopolymers and the opportunities they extend that are not just used as polymer matrices but moreover for filming/coating. Therefore, polysaccharides are tough eco-friendly competitor in the packaging retail which satisfy all the nature related worries (i.e., obtained by sustainable organic matter and decomposable) and also being viable to be produced with the humans along the food, allowing them be consumed in consumable films.

DISCUSSION

Polysaccharide based bio-films of citrus fruit without lipid constituents are barely reviewed. The impact of solely polysaccharide coverings on anatomical characteristics of mandarin fruits is little known. Polysaccharide-driven biofilms owns numerous aids: they are cheap, bio-decomposable, and water-soluble; therefore they don't need organic solvents before, or throughout application. Moreover, polysaccharides have explicit chemical structure which permits for enhancing of their layering/coating properties [3]. For example, the supreme ample native polysaccharide which is Cellulose can be simply altered to make-up a vast variety of cellulose based extracts with different attributes.

The word edible films/coatings in food science refer to fine coating of eatable materials exerted onto surfaces of extremely perishable food stuff, like fresh vegetables and fruits. Edible coating is eco-friendly technology used in various goods to regulate gaseous interchange, moisture transfer or oxidation exercises. Edible films can give an extra defensive layering to generate and can provide the same effect as M.A.S in modifying internal gas composition. The main benefit of application of eatable coatings and films is that various active constituents can be assimilated into the polymer matrix and devoured with the food, thus improving vulnerability as well as sensory and nutritional properties [4]. However, in few instances, consumable bio-films were unsuccessful. The success of consumable films for fresh commodities entirely relies on the regulation of intrinsic gas configuration. Attribute standards for fruits and vegetables layered with consumable films must be observed cautiously and the quality standards must be examined during the entire storage period. Alteration in colour, rigidity loss, ethanol fermentation, metabolic loss of consumable coating and decay ratio in covered fruits need to be examined.

Edible coatings

Consumable layers/film or coating are fine layers of eatable constituents exerted to the extrinsic surfaces of product moreover as an alternative for native defensive sticky covering to give a resistance to oxygen, wetness, and solute motion for the food. They are applied on the eatables covering by brushing, immersing or sprinkling to build a reformed surrounding. As they will be devoured, the material used for the extraction and making of consumable layers and films should be GRAS allowed by government and should agree to the guidelines that are concerned product.

An impeccable film is described as one which can enhance storage life of fresh vegetables and fruits without causing anaerobiosis and lowering deterioration while not altering or impacting their attributes. Earlier, consumable coatings have been used to lower water loss, but new developments of formulated consumable films with a broad variety of permeability features has expanded the potential for fresh produce application [5]. Fruit-based films give improved nutrition to products, which enhance their retail value.

Consumable and decomposable films should satisfy several working principles, for example, solute or gas hurdle, moisture hurdle, water solubility, texture, colour and overall existence, spontaneous attributes less-toxicity, etc. The impact of the coatings on fresh fruit and vegetables depends largely on the temperature, alkalinity, thickness and type of film, and the variety and shape of the fruit and vegetables. The functional features needed for the covering depend on the product matrix (low to high moisture content) and degradation procedure to which the product is prone.

Properties of edible coatings

- The characteristics of consumable films rely mainly on molecular build-up instead of size of molecules and chemical composition.
- Specified pre-conditions for eatable films and coatings are:
- The film must be water-proof so that it stays perfect and shields a product requisitely, when used.
- It must not exhaust oxygen or produce intemperate carbon dioxide.
- It must lower water vapour porosity.
- It must enhance texture, sustain constitutional coalition, and improve mechanical administering features.
- It must melt without degradation above 40◦C.
- It must be non-tacky or should not be sticky, simply emulsifiable and have capable drying performance.
- It must not intervene with the attributes of fresh fruit or vegetable and not transmit unwanted order.

- It must be less viscous and be inexpensive.
- It must be pellucid to non-transparent/opaque but not like glass and proficient to tolerate modest pressure.

CONCLUSION

Conglomeration and double layered films and coatings are the consumable coatings of the future. These 2 types of coatings act to integrate the supportive properties of coating constituents to create a superior film. These films may vary in properties, comprised of mixture of proteins, polysaccharides. Following method permits one to use the various functional features of every type of coating used. The fusion among dimers to create coatings could be from lipids and carbohydrates, carbohydrates and proteins, lipids and proteins or natural polymers. The key target of making strong and bilayer films is to enhance the flexibility or spongy characteristics as per the requirement of particular use.

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