Food Chemistry Advances 2 (2023) 100251

Contents lists available at ScienceDirect

Food Chemistry Advances

journal homepage: www.elsevier.com/locate/focha

Gum Arabic edible coating and its application in preservation of fresh fruits and vegetables: A review

Quazeem Omotoyosi Tiamiyu, Segun Emmanuel Adebayo*, Abdulahi Abdulazeez Yusuf

Department of Agricultural and Bioresources Engineering, School of Infrastructure, Process Engineering and Technology, The Federal University of Technology, P.M.B. 65, Minna, Niger State, Nigeria

ARTICLE INFO

Keywords:
Edible coating
Gum Arabic
Physicochemical properties
Fruit
Vegetable
Preservation

ABSTRACT

Gum Arabic is a polysaccharide polymer that occurs naturally and is widely employed in the biological industry. It is being gotten primarily from the Acacia Senegal and Acacia Seyal trees. Recently Gum Arabic has been used as a postharvest edible coating and has attracted much interest due to its capability to maintain quality and increase the shelf-life of fresh produce. It is an effective food preservative due to its favorable emulsifying, stabilizing, binding, and shelf-life-extending capability. This review highlights the most relevant and current knowledge on using Gum Arabic in postharvest shelf life extension and preservation of fruits and vegetable quality. The effect of Gum Arabic edible coating on physiological response, physicochemical properties, physiological disorders, phytochemical & antioxidant content, and the sensory quality of fruits and vegetables were discussed. Information regarding the gaps in the literature and prospects of Gum Arabic edible coating application on fruit and vegetables were also highlighted.

1. Introduction

Consumers' need for high-quality fruits and vegetables free of synthetic preservatives has been a significant concern (Lin & Zhao, 2007). Horticulturists and others in the food sector have been challenged to develop adequate solutions to fulfill this unique customer need (Tahir et al., 2019). Recently, notable efforts have been made to develop novel preservatives derived from natural sources without adverse health effects on consumers (Vargas et al., 2008). Natural polymers offer several benefits over synthetic polymers, including biocompatibility, biodegradability, and chemical and biochemical adaptability (Gupta et al., 2018; Zare et al., 2019). Food-grade edible films combined with particular additives are thought to increase shelf life and ease food consumption (Sung et al., 2014). The appearance of food continues to be the most critical factor in customer purchasing choices. Food texture is also a key aspect in determining product acceptability, with visual and texture alterations closely connected markers of degradation in fruits and vegetables (Porta et al., 2013). These qualities may be adequately kept by using correct preservation procedures on harvested products. Many postharvest technologies have recently been investigated, but edible coatings appear to be an up-and-coming technique for increasing the storage life of fresh agricultural items after harvest (Baldwin et al., 1995).

Gum Arabic (GA) edible coating is a ground-breaking packaging technique for lowering postharvest diseases and prolonging the shelf life of vegetables & fruits. The increased demand for functional and ecologically acceptable coating materials has focused researchers' attention on Gum Arabic. The food, beverage, pharmaceutical, and cosmetic sectors use Gum Arabic (Patel & Goyal, 2015). There has been a considerable number of research recently conducted on the effect of GA edible coating on postharvest quality preservation of fruit and vegetables; however, to our knowledge, there is currently no extensive review articles published explicitly on the effect of GA on fruit and vegetables. Although, Salehi et al. (2020) and Tahir et al. (2019) published related studies on fruits and vegetables. However, those reviews were not mainly based on Gum Arabic coating but rather on a series of natural gums coating, which makes them to be incomplete of adequate extensiveness. This review discusses the most recent developments regarding applying Gum Arabic edible coatings to control fruits and vegetables' postharvest quality properties. The effect of GA on physicochemical properties, metabolic activities, physiological disorders, and decay were discussed. In addition, the coating formulation, properties, and mode of action are reviewed, and prospects of GA edible coating application on fruit and vegetables are also identified.

2. Gum Arabic (GA)

GA (Fig. 1.) is a polysaccharide-based polymer derived mainly from the stems and branches of two Acacia species: Acacia Senegal and Acacia Seyal tree. It is a polysaccharide due to its complex combination

* Corresponding author.
E-mail address: segun.emma@futminna.edu.ng (S.E. Adebayo).

https://doi.org/10.1016/j.focha.2023.100251
Received 16 September 2022; Received in revised form 17 March 2023; Accepted 22 March 2023