# EFFECT OF CHITOSAN-BASED COATING ON POST-HARVEST QUALITY OF 'MATA KUCING' *(Euphoria malaiense)*

Fatimah Hanisah Ahmad Radzuan[1] and Boon Yih Tien[1,2]*

[1]*Department of Food Science and Technology, Faculty of Applied Sciences, Universiti Teknologi MARA, Cawangan Negeri Sembilan, Kampus Kuala Pilah, 72000 Kuala Pilah, Negeri Sembilan, Malaysia*
[2*]*Alliance of Research & Innovation for Food (ARIF), Universiti Teknologi MARA, Cawangan Negeri Sembilan, Kampus Kuala Pilah, 72000 Kuala Pilah, Negeri Sembilan, Malaysia*

**Corresponding author: boonyihtien@uitm.edu.my*

**Abstract:** The coating method is one of the preservation techniques that has been widely used in preserving post-harvest fruits due to its effectiveness in maintaining the quality, increasing the shelf life, and reducing the wastage of the post-harvest fruits. The chitosan-based coating is one of the edible fruits preserving post-harvest coating as it is able to maintain the quality of fruits such as colour, texture, moisture, sugar content, as well as the flavour of the fruits. This review aims to give an overview of the different treatments of the chitosan-based coating method on 'mata kucing'. The processing and preservation of the 'mata kucing' are recommended to be carried out after their harvest using cinnamaldehyde-chitosan and 2% chitosan treated with glacial acetic acids. The pH should be adjusted from pH 5.0 to 5.5 to avoid precipitation and to provide a good coating solution. The chitosan-based coating is generally safe for human health however it is not recommended for those who are allergic to shellfish. Thus, future research is needed to ensure the safety of chitosan-based coating products especially for those who are allergic to shellfish.

*Keywords*: Preservation techniques, chitosan-based coating, post-harvest, mata kucing

## 1. Introduction

'Mata kucing' *(Euphoria malaiense)* is a tropical fruit from the subspecies of *Dimocarpus longan ssp. malesianus*. The harvesting, processing and transportation process may affect the shelf life and quality of the fruit. For example, the fruits can encounter water loss, texture damage, off-flavour, and browning effect before they reach the customer. Therefore, a preservation technique with an edible coating such as chitosan coating can help to preserve the fruits. The edible coating is not only safe to be consumed but also does not impart unrequired flavour, helps reduce moisture loss and to maintain the firmness of the fruits (Medeiros Teodosio et al., 2021). It also helps in extending the shelf life and maintaining the post-harvest quality of the fruits. The objectives of this study are to investigate the concentration and the best treatment method in preparing the chitosan-based coating solution and to evaluate the coating effect on the quality and shelf life of 'mata kucing'.

## 2. Discussion

### 2.1. Edible coating

The edible coating can be categorized into four groups which are polysaccharide, protein, lipid, and composite based edible chitosan coating (Dhaka & Upadhyay, 2018). Chitosan is one of the

common edible coatings that fall under the group of polysaccharides and has been generally recognized as safe (GRAS) by the United States Food and Drug Administration (USFDA). The wide application of the chitosan-based coating in the food industry is due to its antimicrobial, biodegradability, biocompatibility with human tissue, bio function and non-toxic properties. This coating is a good oxygen barrier that can help in lowering the respiration rate and controlling the ripeness of the fruit since it has a hydrogen bonding structure that is tightly packed.

### 2.2. Treatment of chitosan-based coating solution

Chitosan can be derived from the deacetylation, demineralization and deproteination of chitin from recycled shellfish such as crab and shrimp (Fasciglione et al., 2020). The chitosan powder is diluted with an organic acid such as acetic acid, lactic acid, and propionic acid to obtain an effective coating solution with 0.5% to 5% concentration. However, 2% of the chitosan-based coating is found to be the most effective in preserving the fruits (Eshetu et al., 2019; Suseno et al., 2014). The pH of the coating solution must be adjusted between pH 5.0 and 5.5 to avoid precipitation and to decrease the electrostatic repulsion between the particles. The chitosan coating can be further treated with zinc oxide nanoparticles and cinnamon essential oil to enhance the coating properties.

### 2.3. Application of chitosan-based coating on foods and post-harvest fruits

The chitosan-based coating can be applied to various types of food such as meat, poultry, cereals, vegetables, and others. The egg is one of the foods that is commonly coated with a chitosan-based coating. The coated egg has a stronger eggshell thus minimise the breakage of the eggshell. Next, lettuce also can be preserved with a chitosan-based coating by decreasing the weight loss and maintaining the colour. Mango, 'rambutan', strawberry, *Cavendish* banana, pummelo and navel orange are examples of fruits that have been studied using the chitosan-based coating. The chitosan-based coating can delay the ripening of bananas. Furthermore, the coating also helps in maintaining the total soluble solids, total sugars, and titratable acid contents found in the fruits. The antioxidant activity is also being maintained which gives an excellent colour and post-harvest quality to the fruits.

### 2.4. Effect of chitosan-based coating on 'mata kucing'

'Mata kucing' has soft skin that enables the chitosan-based coating to be absorbed into the flesh hence preserve the quality of the 'mata kucing'. The chitosan-based coating may have the potential to increase the total soluble solids content of 'mata kucing' (Shamshad et al., 2021). The chitosan-based coating also contributes to inhibiting colour declination and maintains the texture of 'mata kucing' as effective on pummelo (Nie et al., 2020). The chitosan-based coating did not impart any taste to the coated fruits and improve the sensory qualities for a longer time. Therefore, the taste, colour, odour, and consumer acceptability of the 'mata kucing' will be maintained. The antimicrobial and antioxidant activity of the 'mata kucing' also will be reduced when coated with a chitosan-based coating.

### 2.5. Challenges of chitosan as a coating on 'mata kucing'

'Mata kucing' continues its transpiration and respiration even after the harvesting process that makes the fruit tends to lose its quality and decrease its shelf life easily. 'Mata kucing' also continues to lose water content after harvesting since there is no water replacement from the plant. Since the fruit has thin flesh, it is easily exposed to the pathogen. It is important to ensure that the coating solution is adjusted to pH 5.0 to 5.5 to avoid precipitation which will reduce the effectiveness of the coating. In addition, the coating might have side effects on people who are allergic to seafood since it is derived from shellfish. Therefore, people who are allergic to seafood should be prevented from participating in the sensory evaluation.

## 3. Conclusion

In conclusion, the chitosan-based coating helps to maintain the quality and to extend the shelf life of the coated fruits. It is recommended to directly coat the flesh instead of the fruit skin of 'mata kucing' to make the coating process more effective. This can be further improved by using nanoparticle size based chitosan coating which can apply directly to the skin of the 'mata kucing'. Further research should be a focus on the application of the chitosan-based coating and its safety issue especially for those who are allergic to shellfish.

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