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EDIBLE COATING FILM INCORPORATED WITH TURMERIC OIL AS ANTIOXIDATION AGENT FOR FRESH-CUT 'FUJI' APPLES

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ABSTRACT

This research is about edible coating incorporated with turmeric oil as antioxidation agent for fresh-cut 'Fuji' apples. Focusing on the performance of fresh-cut fruits as it has crucial problem commonly faced which is enzymatic browning process. This process easily occurred due to cutting process that lead to damage of respiration tissues. Edible coating film are used nowadays as alternative method to preserve fresh-cut fruits instead of using other preservation methods such as salting, pickling, freezing, drying and many others. Edible coatings are made up of hydrocolloid such as starch, protein and lipid. This edible coating film functionality in postponing the enzymatic browning process could be enhanced with presence of additives such as antioxidation agent. Objectives of this research are to formulate the composite edible coating emulsion (CECE) with different concentrations of turmeric oil for fresh-cut fruits coating, to characterise the CECE and the coated fresh-cut fruits in chill condition (6°C) and lastly, to analyse the relationship between dipping time and concentrations of turmeric oil on browning index of the coated fresh-cut fruits through Response Surface Methodology (RSM). In this study, cassava starch and carboxymethyl cellulose (CMC) were chosen as based biopolymer to produce ECE to be applied on fresh-cut 'Fuji' apples. Meanwhile, citric acid used as cross-linking agent, glycerol as plasticiser and turmeric oil (TO) was added in the emulsion as it contains many active compounds that could act as antioxidation agent, thus, embellish more the coating properties. Fresh-cut 'Fuji' apples are used as samples due to high sugar content which could lead to enzymatic browning process and deterioration in short time. The CECE were analysed through surface tension and wettability. It reveals that 6%(w/v) of cassava starch, 2% (w/v) of CMC, 2%(v/v) of glycerol and 0.5%(w/v) of citric acids gave the optimum results for surface tension and wettability (spreading coefficient, work of adhesion and cohesion). Moreover, the Fourier Transform Infrared (FTIR) analysis described that there were interactions occurred when the raw materials being mixed which was show by the changes of peak number and hydrogen concentration. The optimum CECE performance was tested through few characterisations which are weight loss, percentage firmness loss, oxidase enzyme analysis and total phenolic contents (TPC). The weight loss and percentage firmness loss were done for 5 days of storage with different amount of TO concentration and CECE dipping time. From these analyses, it ascertains that at 17.5 μL/mL of TO concentration with 180 s dipping time gave the optimum results. Then, further analyses on enzymatic browning process were done which are oxidase analysis and TPC by using UV-Vis spectroscopy. Results obtained showed that coating with presence of TO lower the oxidase content with percentage efficiency of 41.41% for Day 5 and it also reveals that it had the highest TPC. Surface morphology was analysed by using Scanning Electron Microscope (SEM), while coating thickness was analysed through digital microscopic. The RSM are used to determine the relationship of different TO concentration and dipping time towards browning index. The RSM analysis showed that 30 μL/mL concentration of TO with 180 s dipping time had the lowest value of browning index. Therefore, it can be concluded that the edible coating film contains TO as antioxidation agent and can be used as alternative method in preserving the fresh-cut 'Fuji' apples.

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