Abstract
The Potentiate Production of Phycobiliprotein from Oscillatoria sp. for Its Application as a Food Coating Agent and Microbial Inhabitant †

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Phycobiliproteins (PBPs) are fluorescent proteins of numerous colors with several highly conserved structural and physicochemical characteristics. In addition to their energy harvesting function, PBPs have shown multiple biological activities, comprising antibacterial, antioxidant, and antitumor activities. They are also applied in areas of biomedicine and bioenergy research. The present study was conducted to extract and analyze the use of phycobiliproteins as a food coating agent and microbial inhabitant to enhance the shelf life of fruits and vegetables. Phycobiliproteins were extracted from Oscillatoria sp. using the mechanochemical method and were analyzed via SDS-PAGE. Purified extracts were tested for antioxidant activity, antimicrobial activity, and biopreservational effects. PBP extracts showed higher inhibition zones of 8.2 mm and 8.5 mm for E. coli and Rhizopus, respectively. The edible dip coating technique was more efficient, providing an 8-day shelf life with an 80% freshness of fruits and vegetables. The nitric oxide scavenging activity of the PBP-3 method was 78% with a 200 ug/mL concentration. Phycobiliproteins showed antimicrobial activity against the Staphylococcus aureus and Klebsella sp. An excellent biopreservational effect of the extract was observed from the physical appearance of the control and test group of fruit and vegetables and further from the microbial flora assay. It was concluded that the phycobiliproteins of the Oscillatoria sp. of cyanobacteria represent a potential microbial inhabitant, and their effects of biopreservation make them an effective food coating agent.

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