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Formulation and Characterization of Active Edible Films from Cassava Starch for Snacks and Savories

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Abstract : Edible food packaging are the need of the hour to save life on land and under water by eliminating waste cycle and replacing Single Use Plastics at grass root level as it can be eaten or composted as such. Cassava (Manihot esculenta) selected for making edible films are rich source of starch, and also it exhibit good sheeting propertiesdue to the high amylose: amylopectin content. Cassava starch was extracted by manual method at a laboratory scale and yielded 65 per cent. Edible films were developed by adding food grade plasticizers and water. Glycerol showed good plasticizing property as compared to sorbitol and polylactic acid in both manual (petri dish) and machine (film making machine) production. The thickness of the film is 0.25±0.03 mm. Essential oil and components from peels like pomegranate, orange, pumpkin, onion, and banana brat, and herbs like tulsi and country borage was extracted through the standardized aqueous and alkaline method. In the standardized film, the essential oil and components from selected peel and herbs were added to the casting solution separately and casted the film. It was added to improve the anti-oxidant, anti-microbial and optical properties. By inclusion of extracts, it reduced the bubble formation while casting. FTIR, Water Vapor and Oxygen Transmission Rate (WVTR and OTR), tensile strength, microbial load, shelf life, and degradability of the films were done to analyse the mechanical property of the standardized films. FTIR showed the presence of essential oil. WVTR and OTR of the film was improved after inclusion of essential oil and extracts from 1.312 to 0.811 cm_3/m_2 and 15.12 to 17.81 g/ m_2.d. Inclusion of essential oil from herbs showed better WVTR and OTR than the inclusion of peel extract and standard. Tensile strength and Elongation at break has not changed by essential oil and extracts at 0.86 ± 0.12 mpa and 14 ± 2 at 85 N force. By inclusion of extracts, an optical property of the film enhanced, and it increases the appearance of the packaging material. The films were completely degraded on 84thdays and partially soluble in water. Inclusion of essential oil does not have impact on degradability and solubility. The microbial loads of the active films were decreased from 15 cfu/gm to 7 cfu/gm. The films can be stored at frozen state for 24 days and 48 days at atmospheric temperature when packed with South Indian snacks and savories.

Keywords : active films, cassava starch, plasticizer, characterization
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