

Antimicrobial activities of starch-based biopolymers and biocomposites incorporated with plant essential oils: a review

ABSTRACT

Recently, many scientists and polymer engineers have been working on eco-friendly materials for starch-based food packaging purposes, which are based on biopolymers, due to the health and environmental issues caused by the non-biodegradable food packaging. However, to maintain food freshness and quality, it is necessary to choose the correct materials and packaging technologies. On the other hand, the starch-based film's biggest flaws are high permeability to water vapor transfer and the ease of spoilage by bacteria and fungi. One of the several possibilities that are being extensively studied is the incorporation of essential oils (EOs) into the packaging material. The EOs used in food packaging films actively prevent inhibition of bacteria and fungi and have a positive effect on food storage. This work intended to present their mechanical and barrier properties, as well as the antimicrobial activity of anti-microbacterial agent reinforced starch composites for extending product shelf life. A better inhibition of zone of antimicrobial activity was observed with higher content of essential oil. Besides that, the mechanical properties of starch-based polymer was slightly decreased for tensile strength as the increasing of essential oil while elongation at break was increased. The increasing of essential oil would cause the reduction of the cohesion forces of polymer chain, creating heterogeneous matrix and subsequently lowering the tensile strength and increasing the elongation (E%) of the films. The present review demonstrated that the use of essential oil represents an interesting alternative for the production of active packaging and for the development of eco-friendly technologies.

Keyword: Essential oils; Starch; Biocomposites; Anti-microbacterial; Biodegradable films; Food-packaging applications