

## Clove Oil Incorporated Biodegradable Film for Active Food Packaging

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**Abstract :** Food packaging protects food from temperature, light, and humidity; preserves food and guarantees the safety and the integrity of the food. Advancement in packaging research leads to development of active packaging system with numerous properties such as oxygen scavengers, carbon-dioxide generating systems, antimicrobial active packaging, moisture control packaging, ethylene scavengers etc. In the active packaging, several additives such as essential oils, polyphenols etc. are incorporated into packaging film or within the packaging material to achieve the desired properties. This study investigates the effect on the structural, thermal and functional properties of different poly(lactide) - poly (butylene adipate-co-terephthalate) (PLA-PBAT) blend films incorporated with clove essential oil. The PLA-PBAT films were prepared by a solution casting method and then characterized based on their optical, mechanical properties, surface hydrophobicity, chemical composition, antimicrobial activity against *S. aureus* and *E. coli*, and inhibition of biofilm formation of *E. coli*. Results showed that, the developed packaging film containing clove oil has significant UV-blocking property (80%). However, incorporation of clove oil resulted in reduced transparency and tensile strength of the film as the concentration of clove oil increased. The surface hydrophobicity of packaging film was improved with the increasing concentration of essential oil. Similarly, thickness of the clove oil containing films increased from 36.71  $\mu\text{m}$  to 106.67  $\mu\text{m}$  as the concentration increases. The antimicrobial activity and biofilm inhibition study showed that the clove-incorporated PLA-PBAT composite film was effective against tested bacteria *E. coli* and *S. aureus*. This study showed that the PLA-PBAT - Clove oil composite film has significant antimicrobial and UV-blocking properties and can be used as an active food packaging film.

**Keywords :** active packaging, clove oil, poly(butylene adipate-co-terephthalate), poly(lactide)

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