

Comparative Investigation of Antioxidant Activity of Pectin and Gelatin-based Food Packaging Films Incorporated with Green Tea and TiO₂

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This work comparatively investigated the total phenolic content (TPC) and antioxidant properties of Chitosan/Pectin (CS/PC) and Chitosan/Gelatin (CS/GL) blended nanocomposites reinforced with TiO₂ nanoparticles integrated with green tea extract (GTE), for food packaging applications. Four different GTEs were prepared named GTE 1 (in 10% ethanol, at Room Temperature (RT)), GTE 2 (in 10% ethanol, at 40°C), GTE 3 (in 25% ethanol, at RT), and GTE 4 (in 25% ethanol, at 40°C). By separately integrating the aforementioned GTEs, four PC blended films and four GL blended films incorporated with CS and TiO₂ were fabricated using solvent casting technique. These were then compared with neat materials of CS/PC/TiO₂, CS/GL/TiO₂, and CS/PC, CS/GL. Antioxidant properties of fabricated films were evaluated using the DPPH method, while TPC was determined following the Folin-Ciocalteu method. The lowest antioxidant activity was recorded for the CS/PC in PC blends and CS/GL in GL films. The incorporation of TiO₂ nanoparticles slightly raised antioxidant capacity. Integration of GTEs compatibly enhanced the antioxidant activity of the films in both types, emphasizing films with GTE 4 with the highest scavenging activity (for PC blend = 30.70%, for GL blend = 44.44%). This could be attributed to the initial extraction conditions employed for GTE 4. This is also in good agreement with the highest TPC values for the films with GTE 4, 18.63 mg GAE g⁻¹, 13.70 mg GAE g⁻¹ for PC and GL blends respectively. This study emphasized the potential of using all the fabricated membranes as antioxidant packaging films, and films with GTE 4 as the best. Results also revealed that GL blends have comparatively more potent antioxidant activity than PC blends.

Keywords: *green tea extract, antioxidant activity, food packaging, pectin, gelatin*