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Antifungal edible coatings to control *Alternaria* black spot and maintain the quality of 'Rojo Brillante' persimmon during cold storage

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Abstract

Spain is the second persimmon producing and main exporting country in the world, and 'Rojo Brillante' is the most important cultivar. Nowadays, the main interest of the Spanish persimmon industry is to extend the marketing period to reach off-season markets and technologies such as 1-methylcyclopropene in combination with cold storage are being used to reduce chilling injury and maintain fruit firmness. However, 'Rojo Brillante' persimmon is quite susceptible to postharvest *Alternaria* black spot, caused by *Alternaria alternata*. In recent years, the development of edible coatings formulated with non-contaminating antifungal ingredients, such as some organic and inorganic salts authorized as food additives or GRAS ('generally recognized as safe') substances, has emerged as an alternative to extend the shelf life of fresh fruits and vegetables. In this work, composite edible coatings based on hydroxypropyl methylcellulose (HPMC) and beeswax (BW) were formulated with potassium bicarbonate (PBC) at 2.0% (w/w) or sodium ethyl paraben (SEP) at 0.1% (w / w) as antifungal ingredients and were applied to 'Rojo Brillante' persimmons previously inoculated artificially with *A. alternata*. Coated fruit were incubated at 20 °C for 12 days, at which time the incidence and severity of the disease were evaluated. The effect of the coatings on fruit weight loss, firmness and respiration was evaluated on non-inoculated fruit after 15 and 30 days of storage at 1 °C followed by a shelf-life period of 7 days at 20 °C. The coating containing 0.1% SEP was the most effective to control black spot, with reductions of disease incidence and severity after 12 days at 20 °C of 50 and 65%, respectively. Since this HPMC-BW-SEP coating also reduced weight loss, maintained firmness, and reduced CO₂ production of cold-stored persimmons, it showed potential as a commercial treatment to extend the postharvest life of 'Rojo Brillante' persimmon by reducing black spot and chilling injury.

Keywords: *Alternaria alternata*, disease control, postharvest quality, Diospyros kaki, GRAS substances