An innovative active cardboard box for bulk packaging of fresh bell pepper

Laura Buendía-Moreno, Sonia Soto-Jover, María Ros-Chumillas, Vera Antolinos-López, Laura Navarro-Segura, María José Sánchez-Martínez, Ginés Benito Martínez-Hernández and Antonio López-Gómez

Postharvest Biology and Technology, Volume 164, June 2020, 111171

Abstract

Active packaging including encapsulated essential oils (EOs) may highly increase the shelf life of horticultural products due to the higher antimicrobial activity of EOs in the vapour phase through a controlled release from the packaging. In that sense, the aim of the present study was to study the effects of an active packaging (a cardboard box including a βcyclodextrin (βCD) inclusion complex with an EOs mix) on the quality of bell peppers (green, red and yellow) during storage at 8 °C (90 % relative humidity) up to 18 d. The EO mix (carvacrol:oregano:cinnamon 70:10:20 *v:v:v*) was efficiently encapsulated within the βCD inclusion complex by 94 %. Green, red and yellow peppers packaged within the active box showed 1–2 lower log units of enterobacteria than the control (without the active coating) after 11–18 d. Furthermore, green/red and yellow peppers showed lower mould counts (approximately 1 log unit) than control samples at days 6 and 11, respectively. The decay incidence of samples was also highly controlled by the active packaging with percentages lower than 5 % after 18 d while control samples showed decay incidences of 10–15 %. The use of this active box did not negatively affect the physicochemical quality of peppers even showing red and green peppers of the active box better firmness than control samples after 18 d. The shelf life of peppers stored within the active box reached 18 d while samples stored with the control box were rejected. Carvacrol residues in peppers were very low (below 1 mg kg^{-1}) avoiding off-flavours according to sensory results. Conclusively, this active packaging allowed to extend the shelf life of green, red and yellow peppers for at least 18 d at 8 °C.