Application of edible coating and acidic washing for extending the storage life of mushrooms (Agaricus bisporus)

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Abstract
Hydrocolloid-based materials have been extensively used to coat fruit and vegetables to prolong shelf-life. The effects of different concentrations of acidic washing (acetic, ascorbic, citric and malic acids) followed by coating with gum arabic (GA), carboxymethyl cellulose and emulsified gum arabic (EGA) were evaluated on the weight loss (WL), firmness and color of mushroom. The WL of the uncoated mushrooms was significantly (p < 0.05) greater than that of the coated ones, and the minimum WL was obtained with EGA coating. The mushrooms washed with malic and ascorbic acids showed minimum and maximum of WL, respectively. Loss in firmness of the EGA-coated mushrooms was by 21% (the minimum of loss), while loss value of the uncoated ones was by 39% (the maximum of loss). Firmness of mushrooms was not influenced by the acid type. Concentration of the acid significantly (p < 0.05) influenced the firmness of mushrooms, and at the lowest concentration of acid (1%), the mushrooms tissue was firmest. The L* value of the mushrooms coated with GA was higher than that of others. A significant (p < 0.05) decrease in L* value and a significant (p < 0.05) increase in a* and b* values occurred in the mushrooms washed with acetic acid. Overall, washing with 1% citric or malic acid followed by coating with EGA resulted in minimum decrease in WL and firmness of the mushrooms.

Keywords
Mushroom, coating, colour, weight loss, firmness, lightness

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INTRODUCTION
Mushrooms is used not only as food, but also as functional food and medicines due to their high amount of proteins and minerals, low starch and cholesterol contents and presence of various bioactive compounds (Wani et al., 2010). From the point of view of post harvest physiology, mushroom is one of the most sensitive agricultural crops after harvesting, because there is no cuticle on the cap surface to protect it from physical damage, water evaporation and microbial attack (Brennan et al., 2000; Kim et al., 2006; Sapers et al., 2001). The water content of Agaricus bisporus mushroom is about 90% that accelerates the microbial spoilage and water-dependant reactions (Hershko and Nussinovitch, 1998). Storage of mushrooms at low temperatures (1–4°C) is the main factor to extend the shelf-life by virtue of decrease in microbial growth and physiological reactions such as enzymatic browning and especially respiration rate which is extremely high in mushrooms in comparison with other fruit and vegetables (Kim et al., 2006; Simon and Gonzalez-Fandos, 2010). In addition, Ajlouni et al. (1992) reported that trimming the stipe of mushrooms