

Abstract

In this study, a polyethylene (PE) packaging material that contained nano-Ag, nano-TiO₂, nano-SiO₂, and attapulgite was prepared and its effect on storage stability of mushrooms (*Flammulina velutipes*) was investigated. The results showed that the nanocomposite-based packaging material (Nano-PM) regulated oxygen and carbon dioxide level, eliminated ethylene and inhibited the growth of microbes, which is a benefit on preservation quality of mushrooms, compared to the normal PE material (Normal-PM). After 14 days of storage, mushroom weight loss, mushroom cap opening, stipe elongation and respiration of Nano-PM stored mushroom were significantly ($P < 0.05$) inhibited. Furthermore, treatment with the Nano-PM improved the retention of vitamin C, soluble protein, and total soluble solids contents of *F. velutipes*. The results therefore are promising for the preservation of *F. velutipes* in order to expand its shelf life and improve its preservation quality by use of this Nano-PM.

Industrial relevance

Flammulina velutipes, also named as golden needle mushroom, is one of the most popular edible mushrooms worldwide. Its production and consumption ranked the fourth place among all edible mushrooms in the world. However, fresh golden needle mushrooms are highly perishable. Therefore, preserving freshness of the mushrooms is the main objective of postharvest technology. In the present study, we developed a new type of effective and economic nanoparticle packaging materials and applied it to mushroom preservation. A local company (Jiangsu Tianfeng Biological Technology Co., Ltd) producing mushrooms has started to use this nano-preservation technology during the postharvest transportation and sales. In conjunction with the results of present research, we suggest that nano-composite based packaging materials is a good way for preserving fresh mushrooms and has the potential to be commercialized.