Nanocomposite packaging delays lignification of *Flammulina velutipes* by regulating phenylpropanoid pathway and mitochondrial reactive oxygen species metabolisms

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Abstract

Lignification is an important inducement of quality deterioration of postharvest *Flammulina velutipes*. In this study, phenylpropanoid pathway and mitochondrial reactive oxygen species (ROS) metabolisms were taken as breakthrough points to investigate the lignification mechanism in harvested *F. velutipes* packaged in nanocomposite packaging material (Nano-PM). In comparison with polyethylene packaging material (Normal-PM) and no packaging material (No-PM), Nano-PM prevented the decrease of L* value and the increase of firmness. Nano-PM also maintained a better microstructure. Furthermore, Nano-PM reduced the deposition of lignin by suppressing the enzymes activities involved in phenylpropanoid pathway. In addition, the regulation of ROS in mitochondria alleviated the accumulation of Ca^{2+} and inhibited the programmed cell death (PCD) process, which ultimately delayed the lignification process. These results indicated that Nano-PM delayed the lignification process by regulating phenylpropanoid pathway and the accumulation of ROS in mitochondria.