

Abstract

Energy metabolism is accompanied with postharvest senescence, deterioration and physiological disorder in *Flammulina velutipes*. In this study, nanocomposite packaging material (Nano-PM) inhibited rapid respiration thus preventing accumulation of reactive oxygen species (ROS). In comparison to the normal packaging material (Normal-PM) and no packaging (No-PM), Nano-PM elevated NADP and NADPH contents by increasing the key enzymes in pentose phosphate pathway (PPP), NADK and G6PDH activities, which was due to ROS removal. Moreover, the package enhanced mitochondrial ATPase activity. Regulation of PPP pathway and elevation of ATPase activity was the main reason for the maintenance of mitochondria membrane and structure integrity. Therefore, Nano-PM maintained sufficient ATP content and energy charge by protecting mitochondria structure and regulating electron transfer of mitochondrial respiratory. Overall, Nano-PM maintained energy metabolism by delaying apoptosis and swelling of mitochondria, thus, it alleviated postharvest senescence of *F. velutipes*.