

Energy Status and mitochondrial metabolism of *Volvariella volvacea* with controlled ultrasound treatment and relative humidity

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Abstract

The short-term postharvest of *Volvariella volvacea* (straw mushroom) is still a major challenge hampering its long-distance distribution due to chilling injuries at less 10 °C and rapid senescence at over 20 °C. Our previous study has developed a synergistic control of ultrasound and relative humidity (sCURH) to effectively delay the decay and senescence development of straw mushroom. The present study aimed to explore the possible mitochondria-related mechanism of sCURH to retain the postharvest quality of straw mushroom. Results showed that 10-minute ultrasound pretreatment and 15 °C high RH (95 %) could effectively maintain sensory quality and mitochondrial integrity, and down-regulate the activities and gene transcriptions of respiration-related enzymes (PGI, SDH, and CCO). Ultrasound pretreatment combined with 15 °C + 95 % RH remained the higher contents of ATP ($>61.36 \mu\text{g g}^{-1}$), ADP ($> 28.22 \mu\text{g g}^{-1}$), and energy charge (> 0.56), and a lower AMP content ($<49.18 \mu\text{g g}^{-1}$) compared to those in at 4 °C and 15 °C low RH (75 %). Our finding indicated that the proposed sCURH method could significantly retain postharvest quality of straw mushroom by maintaining proper respiration rates, reducing the mitochondrial dysfunction and supplying sufficient energy.