

Effects of short-term N₂ anaerobic treatment on respiratory metabolism and oxidation status of *Agaricus bisporus*

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Abstract

In this study, the effects of N₂ anaerobic treatment for 6 h, 12 h, and 24 h on respiratory metabolism and the oxidation status of mushroom (*Agaricus bisporus*) were evaluated for a storage period of fifteen days including key enzyme activity of respiratory pathway, antioxidant enzyme activity, brightness, browning index, anaerobic metabolites, and cell ultrastructure. The results showed that 6 h anaerobic treatment inhibited key enzyme activities of glycolysis (EMP), tricarboxylic acid (TCA) cycle and pentose phosphate pathway (HMP), increased the activity of superoxide dismutase (SOD) and catalase (CAT) as well as maintained the cell integrity and functionality compared to other treatments. The intensity of anaerobic treatment was proportional to ethanol production, while the senescence of mushrooms seemed to be closely related to acetaldehyde content. The 24 h treatment showed the highest browning index, which may be related to the cytotoxicity produced by acetaldehyde. Therefore, appropriate anaerobic treatment of 6 h in the condition of this study can reduce the oxidative damage of cells and delay mushroom senescence by regulating the fermentation metabolism at a beneficial level.