Effects of hydrogen sulfide on the quality deterioration of button mushrooms and the interaction with ethylene

Kexiang Wang, Chaoping Wang, Ye Liu, Wenwen Jiang, Wenxiang Li, Fansheng Cheng, Chuangui Ma and Yang Nie

Food and Bioprocess Technology 14: 1983–1995. 2021.

Abstract

Mushrooms are subject to bacterial spoilage, browning, senescence, and quality deterioration immediately after harvest. To uncover the impact of the gasotransmitter hydrogen sulfide (H_2S) on harvested mushrooms, button mushrooms were treated with H_2S, ethylene, and the respective synthesis inhibitor propargylglycine and aminooxyacetic acid (AOA). The results revealed that NaHS (H_2S donor) at the concentration of 0.04 mM remarkably prevented the mushroom weight loss, soluble protein, reducing sugar, and bacterial decay. H_2S application also deferred enzymatic browning by suppressing polyphenol oxidase activity, and regulating phenol metabolism. Moreover, enzymatic reactive oxygen species scavenging systems, including catalase, glutathione reductase, and superoxide dismutase activities could also be regulated by H_2S, postponing postharvest senescence. Moreover, H_2S decreased ethylene production by down-regulating ethylene synthesis gene expression and respective enzyme activity. Notably, although the H_2S synthesis pathway was distinct to green plants, ethylene treatment efficiently inhibited H_2S biosynthesis by down-regulating the *AbCBS/AbCSE* gene expression levels and enzyme activity, while this trend was mitigated by AOA treatment. These findings suggested that H_2S treatment maintained the postharvest quality of mushrooms by regulating senescence process, inhibiting bacterial spoilage, and antagonizing with ethylene.