

A novel anti-browning agent 3-mercapto-2-butanol for inhibition of fresh-cut potato browning

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Postharvest Biology and Technology, Volume 170, December 2020, 111324

Abstract

Enzymatic browning is one of the essential issues affecting the quality of fresh-cut produce. In this study, we identified a novel, safe, and effective anti-browning agent, 3-mercapto-2-butanol, which can prevent fresh-cut potatoes from browning for 5 d under the concentration of 25 $\mu\text{L L}^{-1}$ at 5 °C. The inhibitory effect of 3-mercapto-2-butanol was close to sodium bisulfite. 3-Mercapto-2-butanol was further identified as a competitive inhibitor which directly inhibited the activity of polyphenol oxidase (PPO) by enzyme kinetic analysis, and the expression levels of PPO-related genes (*POT32* and *POT33*) were decreased after 3-mercapto-2-butanol treatment. Besides, the concentration of enzymatic browning substrate tyrosine (Tyr) in the potato chips was found significantly higher in 3-mercapto-2-butanol treatment group than in the control group. We speculated that 3-mercapto-2-butanol could reduce the consumption of Tyr by inhibiting the activity of PPO. Our finding not only provided a novel and safe anti-browning agent candidate (3-mercapto-2-butanol) to efficiently solve the browning issue for fresh-cut food products, but also preliminarily revealed its mechanism in browning inhibition.