Xanthosine is a novel anti-browning compound in potato identified by widely targeted metabolomic analysis and *in vitro* test

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Abstract

Enzymatic browning is the main quality issue of fresh-cut potato. In this study, a widely targeted metabolomics approach was performed to investigate the response of metabolites to pre-cutting short-term warming (SW, an anti-browning treatment) by keeping potatoes at 25 °C for 12 h and screen the endogenous anti-browning compounds. Metabolomics analysis suggested that in SW treated potato, 13 metabolites were significantly up-regulated while six metabolites were down-regulated with multivariate variable importance in projection (VIP) and fold change values of ≥ 1 and ≥ 2, respectively. Among up-regulated compounds, xanthosine, *p*-coumaric acid and xanthine were selected for anti-browning function test and the browning inhibition effects of xanthosine and *p*-coumaric acid was confirmed in vitro test. Xanthosine at concentrations of 50, 500, and 5000 mg L^{-1} significantly reduced the discoloration of potato mash. At concentration of 5000 mg L^{-1}, xanthosine was able to completely prevent the discoloration of potato mash with no browning and the increase in discoloration degree of potato mash with moderate browning. Dipping in 1 mg L^{-1} xanthosine solution for 5 min also reduced the browning of potato slices. Xanthosine addition significantly reduced the polyphenol oxidase (PPO) and peroxidase (POD) activities of potato. Xanthosine could be preventing the development of brown products by reducing the activities of oxidative enzymes. This is the first report that xanthosine can inhibit enzymatic browning in potato. Our results have identified xanthosine as a novel and effective anti-browning compound for fresh-cut potato.