

Cinnamic acid treatment reduces the surface browning of fresh-cut taro

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Abstract

The efficacy of cinnamic acid (CA) as an antibrowning agent was evaluated in fresh-cut taro. Different concentrations (0.1 g L^{-1} , 0.2 g L^{-1} and 0.4 g L^{-1}) of CA treatments reduced the browning index and a^* and b^* values but maintained L^* values, suggesting that CA treatments prevented the browning development of fresh-cut taro during storage. Among the concentrations used, 0.1 g L^{-1} CA was sufficient to reduce browning. CA treatment (0.1 g L^{-1}) reduced the total flavonoid content and the activity and gene expression of four main enzymes (PAL, C4H, 4CL and CHS) in the flavonoid biosynthesis pathway, suggesting that CA treatment reduced taro browning by suppressing the *de novo* biosynthesis of flavonoid compounds. Furthermore, CA treatment significantly reduced the lignin content, activity and gene expression of cinnamyl-alcohol dehydrogenase and slightly reduced the firmness of taro slices. Moreover, CA treatment showed strong inhibition of PPO activity *in vivo* and *in vitro*, suggesting that CA reduced phenolic oxidation by inhibiting PPO activity. CA-treated taro showed significantly reduced hydrogen peroxide content but enhanced activity and gene expression of catalase and peroxidase. In addition, CA had strong radical scavenging activity, suggesting that the application of CA to fresh-cut taro enhanced antioxidant activity. Overall, CA treatment reduced the surface browning of fresh-cut taro by suppressing the activity of browning-related enzymes and by improving antioxidant activity. The results presented in this study indicate that CA is an effective natural antibrowning agent for fresh-cut taro.