Characterization and Comparative Study of Polyphenol Oxidases from Four Cultivars of Thai *Solanum melogena* Fruits

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ABSTRACT

This study characterized the polyphenol oxidases (PPO) from four cultivars of eggplant (Thai Solanum melogena), representing a variety of fruit characteristics, textures, and peel colors. The study compared the effects of different substrate specificity, temperature, pH, thermal stability, and inhibitors on PPO activity to determine the optimal conditions for generating natural browning agents. Khaow yoa (OW) and Moung khan khew (OP) cultivars had the highest specific activity (OW: 631.33 ± 38.29 ΔOD min^{-1} mgProtein-1; OP: 652.54 ± 9.59 ΔOD $min^{-1}mgProtein^{-1}$), using 4-methylcatechol as a substrate. The best substrate for PPO from each cultivar was different: catechin for cultivars OW and OP, 4-MC for Choa pra ya (RG), and 4-tert butylcatechol for Khaew yoa (OG). Using 4-methylcatechol as a substrate, the optimal conditions for maximizing PPO activity were similar for all four cultivars: a pH of 6.0, a temperature of 30°C, and an enzyme concentration of 1% (v/v). For all cultivars, PPO activity decreased with increasing inactivation time after the temperature reached 30°C. The study tested the inhibitory effects of compounds such as ascorbic acid, citric acid, sodium chloride, sodium metabisulfite, and EDTA on the activity of residual enzyme. Ascorbic acid and sodium metabisulfite were the most effective inhibitors for these eggplant PPOs.

Keywords: Eggplant, Polyphenol oxidase, Browning, *Solanum melogena*, Inhibitors

INTRODUCTION

Browning in fruits and vegetables is considered undesirable. It shortens the shelf-life of fresh-cut fruits and vegetables by reducing their visual appearance, and in fresh products, it is associated with a loss of nutritional value (McEvily et al., 1992). Browning is caused by enzymatic oxidation of natural phenolic compounds in fruit tissue in the presence of oxygen. The oxidation of phenolic substances to quinones, catalyzed by polyphenol oxidase, is the primary cause. The quinones then condense to form dark pigments (Beaulieu et al., 1999). Most current research