

Inhibition of the Activity of Polyphenol Oxidase Enzyme Present in *Annona muricata* and *Musa acuminata* by the Experimentally Identified Natural Anti-Browning Agents

Authors : Michelle Belinda S. Weerawardana, Gobika Thiripuranathar, Priyani A. Paranagama

Abstract : Most of fresh vegetables and fruits available in the retail markets undergo a physiological disorder in its appearance and coloration, which indeed discourages consumer purchase. A loss of millions of dollars yearly to the food industry had been due to this pronounced color reaction called Enzymatic Browning which is driven due to the catalytic activity by an oxidoreductase enzyme, polyphenol oxidase (PPO). The enzyme oxidizes the phenolic compounds which are abundantly available in fruits and vegetables as substrates into quinones, which could react with proteins in its surrounding to generate black pigments, called melanins, which are highly UV-active compounds. *Annona muricata* (Katu anoda) and *Musa acuminata* (Ash plantains) is a fruit and a vegetable consumed by Sri Lankans widely due to their high nutritional values, medicinal properties and economical importance. The objective of the present study was to evaluate and determine the effective natural anti-browning inhibitors that could prevent PPO activity in the selected fruit and vegetable. Enzyme extracts from *Annona muricata* (Katu anoda) and *Musa acuminata* (Ash plantains), were prepared by homogenizing with analytical grade acetone, and pH of each enzyme extract was maintained at 7.0 using a phosphate buffer. The extracts of inhibitors were prepared using powdered ginger rhizomes and essential oil from the bark of *Cinnamomum zeylanicum*. Water extracts of ginger were prepared and the essential oil from Ceylon cinnamon bark was extracted using steam distillation method. Since the essential oil is not soluble in water, 0.1 μ l of cinnamon bark oil was mixed with 0.1 μ l of Triton X-100 emulsifier and 5.00 ml of water. The effect of each inhibitor on the PPO activity was investigated using catechol (0.1 mol dm⁻³) as the substrate and two samples of enzyme extracts prepared. The dosages of the prepared Cinnamon bark oil, and ginger (2 samples) which were used to measure the activity were 0.0035 g/ml, 0.091 g/ml and 0.087 g/ml respectively. The measurements of the inhibitory activity were obtained at a wavelength of 525 nm using the UV-visible spectrophotometer. The results evaluated thus revealed that % inhibition observed with cinnamon bark oil, and ginger for *Annona muricata* was 51.97%, and 60.90% respectively. The effects of cinnamon bark oil, and ginger extract on PPO activity of *Musa acuminata* were 49.51%, and 48.10%. The experimental findings thus revealed that *Cinnamomum zeylanicum* bark oil was a more effective inhibitor for PPO enzyme present in *Musa acuminata* and ginger was effective for PPO enzyme present in *Annona muricata*. Overall both the inhibitors were proven to be more effective towards the activities of PPO enzyme present in both samples. These inhibitors can thus be corroborated as effective, natural, non-toxic, anti-browning extracts, which when added to the above fruit and vegetable will increase the shelf life and also the acceptance of the product by the consumers.

Keywords : anti-browning agent, enzymatic browning, inhibitory activity, polyphenol oxidase

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