

## ABSTRACT

The effect of plant extracts (clove and lemon balm extracts) on the inhibition of enzymatic browning has been investigated in order to compared with the use of sodium bisulfite. Also, the effect of extract's concentration, temperature, and pH has been studied. In order to observe the inhibition effect, fresh sliced apples were dipped in extract solution or sodium bisulfite solution for 10 min and then exposed to air at room temperature for 4 hours before measurement. The enzymatic browning of samples was evaluated by color measurement in CIELAB system using a colorimeter (Minolta CR-400, Japan). Total color difference ( $\Delta E^*$ ) and relative total color difference ( $\Delta(\Delta E^*)$ ) were used as the indices of enzymatic browning inhibition in which a higher  $\Delta E^*$  and lower  $\Delta(\Delta E^*)$  values indicate a better inhibition. The results found that the optimization of clove extract provided a greater effectiveness than that of lemon balm extract on the inhibition of enzymatic browning. Although only the optimization of clove extract ( $\Delta E^* = 1.51$  and  $\Delta(\Delta E^*) = 4.27$ ) can provide a greater inhibitory effect than sodium bisulfite ( $\Delta E^* = 1.81$  and  $\Delta(\Delta E^*) = 4.18$ ), its use for sodium bisulfite substitution cannot be confirmed due to non-corresponding results of visual appearance. However, the optimization of clove extract still provided the considerable inhibitory effect on the enzymatic browning. It can be successively used as one alternative for natural antibrowning agents.