Changes in 3-, 2-monochloropropandiol and glycidyl esters during a conventional baking system with addition of antioxidants

ABSTRACT

Shortening derived from palm oil is widely used in baking applications. However, palm oil and the related products are reported to contain high levels of monochloropropandiol (MCPD) ester and glycidyl ester (GE). MCPD and glycidol are known as process contaminants, which are carcinogenic and genotoxic compounds, respectively. The objective was to evaluate the effects of antioxidant addition in palm olein and stearin to the content of MCPD esters and GE in baked cake. Butylated hydroxyanisole (BHA), rosemary extract and tocopherol were used to fortify the samples at 200 mg/kg and in combinations (400, 600 and 800 mg/kg rosemary or tocopherol combined with 200 mg/kg BHA). The MCPD esters and GE content, radical formation and the quality of the fats portion were analyzed. The results showed that palm olein fortified with rosemary extract yielded less 2-MCPD ester. The GE content was lower when soft stearin was fortified with rosemary. ESR spectrometry measurements showed that the antioxidants were effective to reduce radical formation. The synergistic effects of combining antioxidants controlled the contaminants formation. In conclusion, oxidation stability was comparable either in the single or combined antioxidants. Tocopherol in combination with BHA was more effective in controlling the MCPD esters and GE formation.

Keyword: Radical; Palm-based shortening; Baking system; MCPD esters mitigation; GE mitigation