

Separation and Quantification Method for Triglyceride Molecular Species with High Performance Liquid Chromatography-Diode Array Detector.

Application to the Analysis of Lipid Oxidation during Wheat Flour Mixing by Wheat, Soybean and Horse Bean Lipoxygenases.

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Lipids are minor components of wheat, horse bean or soya flour (1.4 %-2 % of flour). They contain different molecular species among them the triglycerides (TG) are the main fraction. Although lipids are a minor component, they play an important part in the baking quality of wheat flour. After milling, wheat flour is usually stored for short periods before use. During this period, called flour maturation, two kinds of reactions (hydrolysis and oxido-reduction) are observed. First, TG hydrolysis attributed to wheat lipases, leads to an increase of free fatty acids. Second, an oxidation of free polyunsaturated fatty acids (PUFA), mainly catalyzed by wheat lipoxygenase (LOX) leads to a loss of these fatty acids. Soybean (or horse bean) flour is frequently added to wheat flour to improve its baking quality. During dough mixing, free PUFA are oxidized by wheat LOX whereas soybean LOX is also able to act on PUFA present in the TG fraction leading to an increase of oxygen uptake by dough during mixing. Therefore, we developed a new method using high performance liquid chromatography (HPLC-Diode Array Detector DAD) system for the separation and the quantification (UV detection at 205 nm) of TG contained in flours and doughs. Among the fourteen different TG found in doughs and identified by LC-MS, seven were commercially available allowing to establish their calibration curves at 205 nm. The response factor of the non available TG was calculated from their composition in fatty acids. Therefore, we were able to quantify TG in the doughs made with pure wheat flour and wheat flour containing a small fraction of soybean (or horse bean) flour. We confirm that soya LOX is able to act on the PUFA contained in TG in contrast to wheat LOX which is almost only active on free PUFA. We observe that horse bean LOX is also able to act on PUFA contained in TG.