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Enzymatic hydrolysis of rapeseed oil with a non-GMO lipase: a "clean label" strategy in food products development

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PURPOSE OF THE ABSTRACT

Mono- and diglycerides of fatty acids (MDGs) are commonly used in the fabrication of food products (inclusion complexes with amylose or impact emulsions stability and structure) . These compounds, derived from triglycerides, are considered as food additives and have to be mentioned on the ingredient list. The aim of this study was to use an enzymatic strategy in order to generate in situ mono- and diglycerides of fatty acids, starting from rapeseed oil and a non-GMO lipase through emulsification. Reaction products were characterized by Gas Chromatography (GC) and Proton Nuclear Magnetic Resonance (1H NMR) spectroscopy was employed as an additional technique to qualify and selectively identify the monoglyceride isomers. Lipolysis can be also assessed as a function of time by 13C NMR, where triglyceride consumption and the formation of in-situ emulsifiers were selectively identified and compared. After 2 hours of lipolysis, a high amount of MDGs are reach. Beyond this point, a continuous decrease was observed until 24 hours where oils are composed with an excess of free fatty acids. Samples of the modified oil were then used directly as ingredients in the production manufacture of sponge cakes or ice creams.

In soft cakes, the structure and the softness of the products were characterized and followed-up to 6 months after production.

The thermal behaviors of oils (such as crystallization and melting temperatures measured by differential scanning calorimetry) was greatly affected by the lipolysis. These modifications were then exploited in ice cream formulations with a significant impact on overall hardness and flowing during defrosting when compared to a control product made with unmodified rapeseed oil.

This approach limits the use of saturated fats and offers a good balance between texture and nutritional benefits.?

FIGURES

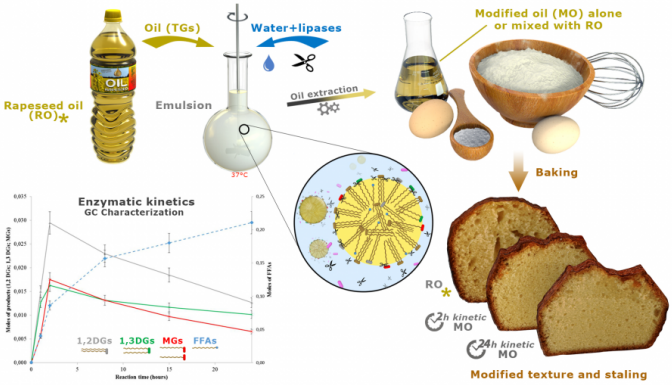

FIGURE 1
Lipolysis and soft cakes
General approach

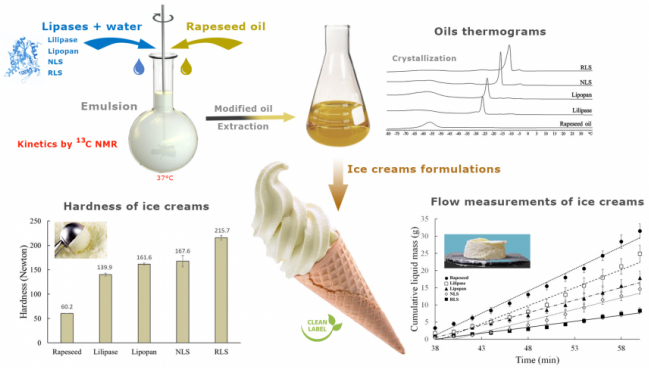

FIGURE 2
Lipolysis and Ice creams
General approach

KEYWORDS
clean-label | NMR determination | Food formulation | lipases

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