

New Oils for Pan-frying Applications

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The objective of Optim'oils project, supported by the European Commission (FP6-FOOD 36 318, www.optim'oils.com), is to develop new vegetable oils richer in micro-constituents that are naturally present in oil seeds and have positive effects on nutritional value and stability of oils, e.g. tocopherols and phenolic compounds. By optimising different operating conditions for the crushing of sunflower (Sun) and rapeseed (Rap) seeds and for the refining of corresponding crude oils, several oils called "optim'oils" have been produced, with higher level of antioxidants compared to classical reference refined oils (Ref). The ability of such optim'oils to be used in pan-frying, an usual culinary operation involving high temperatures (~170 °C in oil after addition of potatoes) and large area in contact with air, was studied for two optim'oils: an "Optim Sun", produced by specific conditions of mechanical crushing and soft refining, vs Sun Ref and for an "Optim Rap", obtained by specific hexane extraction and soft refining conditions, vs Rap Ref.

A three steps methodology was set up:

- i. Designing of an experimental pan-frying pilot with dedicated instrumentation and development of a simulation tool allowing to control the process and to establish temperature and heat flux profiles in the system ;
- ii. Determination of realistic frying conditions leading to a high degradation of usual oils in order to point out the potential interest of the optim'oils ;
- iii. Evaluation of the performance of the optim'oils in these conditions by measuring relevant markers of oxidation and following antioxidants.

In drastic conditions of frying (3 min pre-heating, surface power density of 6800 W/m² and 2.5 mm layer of oil), optim'oils are less oxidized than reference oils, with a lower production of conjugated dienes, respectively - 40 % and - 60 % for Sun and Rap oils. This lower lipidic oxidation can be explained by the presence of phenolic compounds in optim'oils (e.g. 350 mg/kg in Optim Rap) and a significantly lower degradation of tocopherols during the cooking process.