

High Temperature - Short Time Pre-conditioning of Rapeseed: a Polyphenol-enriched Oil and the Effect of Refining

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Before pressing, oilseeds are generally pre-conditioned. For the case of rapeseeds, this process normally involves flaking and a thermal treatment. During this last operation, where the seeds are held 30 minutes at temperatures of 100 °C, the cell walls are partially destroyed, proteins are denatured and the naturally occurring enzymes are inactivated. As a result of this process, oil of better quality is obtained and the efficiency of the pressing operation is improved.

In this work, a pre-treatment process for rapeseeds, which involves the use of high-temperature steam and short residence times (HT-ST), is presented. This method, besides accomplishing the beneficial effects of the mentioned industrial heat treatment, leads to an enrichment of some important minor compounds (polyphenols and phosphatides) in the resulting oil.

Rapeseeds were pre-treated using the mentioned HT-ST method. The effect of treatment time and of temperature was evaluated. Then, the seeds were pressed and the press-cake was solvent extracted. The obtained oils were mixed and refined. Both chemical and physical refining methods were applied and the effect of each step of the refining process on the content of minor compounds, such as tocopherols, sterols and polyphenols, was determined.

The results show that the polyphenol content of the oil coming from pre-treated seeds is higher than that of oil from untreated or conventionally treated seeds. The polyphenol concentration depends on both temperature and conditioning time. 2,6-dimethoxy-4-vinylphenol (vinylsyringol), a decarboxylation product from sinapic acid was identified as the main phenolic in the oil. During the neutralization step of the chemical refining process, the polyphenol content is drastically reduced. Through physical refining, oil samples with about 50% of the initial polyphenol content were obtained. These samples present a higher oxidative stability than both chemically refined oils and commercial rapeseed oils.