

Stability of LCPUFA enriched Rapeseed Oils and Emulsions

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Rape seed oil is recommended by nutritionists due to its favourable fatty acid profile. Its content of saturated fatty acids (7 - 8%) is the lowest amongst vegetable oils, the content of monounsaturated fatty acids (approx. 60 %) is almost equal to olive oil, and the ratio of linoleic acid to linolenic acid is close to 2:1. As LCPUFA such as eicosapentanoic (EPA) and docosahexanoic acid (DHA) are naturally not present in rape seed oil it has been the aim of research projects such as NAPUS 2000 to genetically modify rape plant material.

In order to estimate the effect of the presence of EPA and DHA in rapeseed oil with respect to its oxidative stability, studies were carried out with model oils. The first group of model oils were based on oil from a low-linolenic acid variety, containing 5 % alpha-linolenic acid (ALA), which was blended with ethyl esters of EPA, DHA and ALA (as control) in different amounts. Further, the oils were enriched with tocopherols according to their diene equivalents according to the Witting factors (for nutritional purposes).

The second group of model oils was a blend of rapeseed oil (10% ALA) and fish oil. The oils were purified (removal of naturally present antioxidants) to be used for investigating the effects of added antioxidants.

The formation of primary and secondary oxidation in oils with 5 % and 10 % LCPUFA was markedly enhanced compared to the control. The degradation of tocopherols was also more rapidly in LCPUFA oils compared to the control. During storage at 40°C the tocopherol concentration decreased to 1200 mg/kg within two weeks. However the start concentration was approx. 2000 mg/kg in the 10 % LCPUFA oil vs. 1400 mg/kg in the 5 % LCPUFA oil. The oils were supplemented with a mixture of tocopherols containing gamma- and delta-tocopherol, but the degrading effect of alpha-tocopherol overwhelmed the protective effects of the other isomers.

Fractions of the rape seed meal extracts containing sinapic acid were found to effectively stabilise purified rapeseed-fish oil blends (bulk oil, emulsion) towards oxidation.