

Enzymatic Modification of Soybean Oil with Conjugated Linolenic Acid from Mahaleb (*Prunus mahaleb* L.) Seed Oil

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Soybean oil is rich in two essential fatty acids, linoleic and linolenic acids. These acids aid the body's absorption of vital nutrients and are required for human health. Conjugated linolenic acids (CLNA) is the collective term for a mixture of conjugated positional and geometric isomers of octadecatrienoic fatty acids. The mahaleb seed oil contains 27- 40% of CLNA, mainly α -eleostearic acid. CLNA, especially α -eleostearic acid, potentially have beneficial effects on human health by reducing visceral lipids and enhancing immune response and preventing metabolic disorders of type2 diabetes.

The objective of this study was to enhance the nutritional properties of soybean oil by the incorporation of CLNA into their triacylglycerols (TAG). The structured lipids were produced from soybean oil (SO) by acidolysis with mahaleb oil fatty acids (MFA) having 40.0% of CLNA with Lipozyme TL IM (*Thermomyces lanuginosa*) lipase. Effects of reaction parameters (reaction time, substrate molar ratio, enzyme load, and temperature) on the incorporation of CLNA into SO were studied and optimized.

In general, acidolysis reactions were conducted using 1.0 g of substrates, enzyme and 5 mL hexane in an orbital shaker at 220 rpm and at specified temperature. At first, acidolysis products consisted of TAG and free fatty acids (FFA) were filtrated to remove the enzyme. Then the TAG products were separated from FFA by deacidification with 0.02 M NaOH and their fatty acid compositions were determined by GC.

Series of acidolysis reactions were carried out using the enzyme load of 7-19% (w/w of total substrates), varying temperature between 35 to 60 °C and taking the molar ratio of SO:MFA from 1:3 to 1:7 for 1-5h. The optimal mole ratio of substrates, time, temperature, and enzyme amount were established as 1:5, 3h, 50 °C, and 10%, respectively. At these optimal conditions, the modified soybean oil containing 23.1% CLNA (20.2% α -eleostearic acid) was obtained.

Thus obtained CLNA-rich soybean oil would be used as a source of dietary CLNA and essential fatty acids in the formulation of food products.