

ASPECTS OF WALNUT OIL (*JUGLANS REGIA L.*) APPLICATION FOR NEW FUNCTIONAL PRODUCTS OBTAINING

Oxana N. Radu^{1*}, Alexei V. Baerle^{1*}, Tatiana N. Capcanari^{1*}, Pavel Gh. Tatarov^{1*}

¹Faculty of Food Technology, Technical University of Moldova, Stefan cel Mare 168 street, Chisinau, Republic of Moldova

*Corresponding author: oxana.radu@sa.utm.md

Nowadays, foods fortified with essential omega-3 and omega-6 polyunsaturated fatty acids (PUFAs) stand out among different types of functional products due to their high biological potential. The replacing of traditional lipids with walnut oil (*Juglans regia L.*) containing up to 83% polyunsaturated fatty acids could become a new trend in the food industry. On the other hand, the use of lipids in the form of walnut oil is a complex technological problem due to its irreversible rapid oxidative changes. To prevent the process of oxidative degradation of polyunsaturated fatty acids different food compositions based on walnut oil were studied.

The rheological analysis of lipid systems with walnut oil showed that solid vegetable fats balance the melting points of the vegetable oils mix due to the high concentration of saturated fatty acids. Walnut oil becomes a product with a spreadable texture and a melting temperature similar to that of vegetable shortening ($30 \pm 3^\circ\text{C}$) in compositions with 10...30% cacao butter, 30...50% palm oil, and 5...15% coconut oil (Figure 1). Contrary to the fact that palm oil ($27.1 \pm 0.1^\circ\text{C}$) doesn't have the highest melting temperature compared to cocoa butter ($31.2 \pm 0.2^\circ\text{C}$), exactly this product prevails in stabilized samples. The composition of palm oil consists essentially of saturated fatty acids with a longer aliphatic chain $C_{<n>}$ ($<n> = 16.16$) than in cocoa butter ($<n> = 15.25$). Thus, the solid composition of walnut oil can be obtained by combining it with 15% saturated fatty acid with a carboxylic chain length $n = 18$. "Rancimat" analysis showed, that the oxidative stability time of the mixture of walnut oil with palm one (1:1) is 1.15 times longer than in the same blend with cocoa butter. The presence of monounsaturated fatty acids in the composition accelerates the oxidation of walnut oil, the induction time of its blend with oleic (1:1) acid being 2.4 times shorter than that of pure walnut oil. The stabilization of walnut oil PUFAs by design of balanced and structured compositions with saturated solid vegetable fats is a good and safety way in order to obtain new functional food products such as vegetable shortening with high biological value.

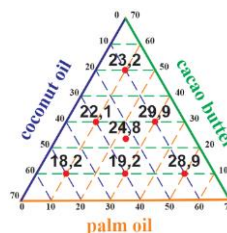


Fig.1. Melting temperatures of fat systems containing 30% Walnut oil

Keywords: polyunsaturated fatty acids, oxidative stabilization, saturated fats, shortening

Acknowledgment: The research was funded by State Project 20.80009.5107.09 "Improving of food quality and safety through biotechnology and food engineering", running at Technical University of Moldova.