

19. Carotene stability in the oil composition based on walnut oil (*Juglans Regia L.*)

Oxana Radu, Olga Dimova, Cristina Popovici, Alexei Baerle*
Technical University of Moldova

Introduction. The ratio of unsaturated/saturated fatty acids in cold pressed walnut oil (*Juglans Regia L.*) is twice as high as in olive one [1, 2]. The degradation rate of vegetable oils rich in polyunsaturated fatty acids can be reduced by the use of antioxidants. One of the most widespread fat-soluble antioxidant is β -carotene, which capacity to stabilize walnut oil was criticized. Therefore, an experiment was planned to determine the stability degree of oil composition that contained walnut oil, sunflower oil, green tea extract and carotene.

Materials and methods. Walnut oil was extracted using cold pressing with an electrical lab press from walnuts of *Kogylnichanu* cultivars, crop 2015, the State Enterprise “Forestry Iargara”, Republic of Moldova. The carotene solution was obtained by diluting 1 ml of concentrate in 19 ml of sunflower oil.

A Full three-Factor, two-level Experiment (FFE 2³) was applied to estimate the factors of influence: the concentration of walnut oil – x_1 , the concentration of tea extract – x_2 , the temperature – x_3 ($t_{\min} = 4-6^{\circ}\text{C}$, $t_{\max} = 20-23^{\circ}\text{C}$). The volume of carotene solution was constant ($V_{\text{car}} = 1$ ml) in each sample. Total sample volume was 15 ml.

Results and discussion. The optical density of the most significant absorption peaks was exposed to regression analysis. **The significant coefficients** that satisfy the inequality: $|\beta| \geq 0.013$ were highlighted in the Table 1.

Table 1. The regression coefficients of oil compositions spectra after 3 weeks

Λ , nm	the coefficients of direct influence				the interaction coefficients			
	β_0	β_1	β_2	β_3	β_{12}	β_{13}	β_{23}	β_{123}
670	0.194	0.010	0.058	-0.001	0.014	-0.008	-0.002	-0.001
438	0.333	0.013	0.007	0.003	0.010	-0.012	0.000	-0.006
458	0.340	0.014	-0.012	0.005	0.009	-0.013	0.000	-0.006
489	0.279	0.011	-0.005	0.005	0.006	-0.011	0.000	-0.006

Important observations result from the demonstrated regression coefficients:

- walnut oil “directly” stabilizes carotene, but not carotene stabilizes walnut oil, because the coefficients β_1 are significant;
- the interaction coefficients β_{12} are positive, so the mix of walnut oil and tea extract ... stabilize carotene;
- the interaction factor X_{13} (walnut oil – temperature) destabilizes carotene, because the coefficients β_{13} are negative and significant.

Conclusions. The stability of the researched composition components decreases in the series: *carotene – walnut oil – tea extract*. In other words, tea extract demonstrates the greatest antioxidant activity in the examined system. Nevertheless, it doesn’t mean that carotene has no stabilizing effect at all. After all, carotene was the research object, but not the factor of influence, and the experiment was originally planned to determine the influence of various factors on the stability of carotene in the oil composition.

References:

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2. Uzunova G., Perifanova-Nemska M., et. al. *Chemical composition of walnut oil from fruits on different years old branches*. Bulg. J. of Agric. Sci., 2015, **21**, 3, p.494-497