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EFFICACY OF SYNTHETIC ANTIOXIDANTS IN OXIDATIVE STABILITY OF COLD PRESSED WALNUT OIL

Introduction.The cold-pressing procedure involves neither heat nor chemical treatments, and it is becoming an efficient substitute for conventional practices because of consumers' desire for natural and safe food products. The consumption of new and improved products such as cold-pressed vegetable oils containing bioactive substances may improve human health and prevent certain diseases [1]. The purpose of this study is to obtain cold pressed walnut oil with a high oxidation stability and biological value, contributing to improve the nutritional status of the population. In this regard, the possibility to incorporate the antioxidants in cold pressed walnut oil was studied.

Materials and methods.The walnuts were cracked, shelled, and then milled into a fine powder in an electric mill. Walnut oil (WNO) was extracted using cold pressing with an electrical lab press. Oil samples with different amount of antioxidants were stored in dark-glass bottles at 25±3ºC until analysis. Walnut oil without antioxidants was used as reference sample. A FFE 2^3 (Full three-Factor, two-level Experiment), was applied to estimate the effects of independent factors: n-Octyl Gallate (OG), X1 (25…75mg/g), racemic DL-α-Tocopherol (DLTP), X2 (65…195mg/g) and L-Ascorbic Acid 6-Palmitate (AAP), X3 (40…100mg/g). For the control test, oil samples without added antioxidants were used. After the expiration of 14, 60 or 75 days of storage each individual oil sample was subjected to spectral and chemical analysis.

Results and discussions. UV spectra of the system WNO-OG-DLTP-AAP are characterized with absorption peaks at 271, 282, 291, 302 and 319 nm. The optimal dilution of system with hexane, necessary to obtain high-quality spectra, is approximately 1:10...1:12. Only one factor undoubtedly destabilizes spectra, and accordingly, the walnut oil: this is DLTP. Two independent analytical methods, namely, analysis of the peroxide number and para-anizidine index confirm the role of DLTP not as the antioxidant, but vice versa, as the destabilizing agent for walnut oil. OG is the best deoxidizer from all of antioxidants studied. The factors of pure influence, OG and AAP, protect walnut oil from the accumulation of the primary and secondary oxidation products. The most interesting benefit is the combined effect of the pair OG-AAP, leading to the reduction of PN and PAI, ie, protection of walnut oil. Joint "good" effect of the combinations OG-DLTP and DLTP-AAP does not cover the "bad" action of pure DLTP. With the help of three independent methods, was demonstrated that the most effective antioxidants are n-Octyl Gallate, L-Ascorbic Acid 6-Palmitate, and its mixtures.

Conclusions. Properties of cold pressed walnut oil were monitored under storage conditions of darkness and room temperature over 2 months. Accordingly to the independent spectral and analytical data, DLTP which has been added in the walnut oil, shows itself as pro-oxidant, rather than antioxidant for this food product, and thus is not suitable for it. The linear regressions demonstrate synergetic super-addition effect of AAP-OG compositions, beneficial for increasing of walnut oil stability by safety amounts of antioxidants. A joint use of these antioxidants in small amounts significantly reduces lipid oxidation and increases the shelf life of walnut oil.

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References

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