

Effect of Light-emitting Diode (LED) Light Exposure on Vegetable Oils Oxidation as Related to Storage

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Lipid oxidation is one of the main degradation processes that can greatly affect the overall quality of oils. In addition, the photosensitized oxidation could be critical in non-refined oil due to its high content of pigments, which act as photosensitizers promoting lipid oxidation. On the other hand, in retail stores the light-emitting diode (LED) light use is growing due to its low-power consumption; however, there is some disagreement about the effects of LED on lipid oxidation. A study on the effect of LED (6500 °K; 1500 lumen) light exposure on the oxidation of non-refined hemp, linseed and sunflower oils stored in green bottles for 6 months at 20 °C was carried out. The results were compared with those obtained using a neon lamp in the same conditions (control). Free acidity, peroxide value (PV), p-anisidine value test (AV), total volatile compounds (electronic nose), oxidative stability test (oxitest), color measurement ($L^*a^*b^*$), spectra analysis (VIS) and sensory analysis were utilized to follow the extent of oils oxidation. In general, hemp oil was more prone to oxidation than other oils, and after 4 months of exposure to LED light the PV reached the highest value (9.31 ± 0.20 mEq O₂/kg oil). The AV also increased during the storage up to 1.95 ± 0.19 (6 months) even if the LED lamp lead to lower value. The color was mainly affected by storage mostly for hemp and linseed oils, since all parameters significantly increased; that reflects pigment (such as chlorophylls) degradation. However, the LED light exposure of hemp and linseed oils for 6 months lead to lower value of L^* , a^* and b^* than those found after neon lamp exposure. The sensory analysis revealed significant differences just for hemp oil after 2 months of storage. In consideration of abovementioned results, the LED light exposure significantly affected the oil oxidation; however, a deeper evaluation is needed in order to better define the impact of LED light on photosensitized oxidation of vegetable oils as related to their composition.

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