STABILITY OF SOME VEGETABLE OILS SUPPLEMENTED WITH ASTAXANTHIN AS ANTIOXIDANT

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Microalgae-derived antioxidants are starting to gain popularity in the processing of functional and organic foods. Astaxanthin (AXT) is included in the list of these antioxidants. The antioxidant potential of AXT allows food technologists to offer a wide range of functional foods. Incorporating astaxanthin into oils is a promising alternative to using this pigment. Vegetable oil can be one of the main factor in the solubilization and stability of astaxanthin, as well as its bioavailability, thus determining the fields of application of the final product. Research has been conducted to establish the antioxidant effect of natural astaxanthin from biomass of green microalga *Haematococcus pluvialis*, which was added to oils. The method of inducing thermal oxidation at a temperature of 60^0C was used with the monitoring of the formation of conjugated dienes at 234 nm in a mixture of oil/hexane at a dilution of 600 times. Astaxanthin from *H. pluvialis* biomass was supplemented to vegetable oils at the concentration of 0.26 mg/ml. Oils of sunflower, olive, sesame, almond, poppy seeds and walnut kernels were used.

The conditions of thermal oxidation of vegetable oils have highlighted the stability of oils with a high content of oleic acid. Thus, during 180 min in olive oil, the content of conjugated dienes increased by 1.7 times. In sesame seed oil and almond oil, the content of conjugated dienes increased by 2.2 times. The highest values of the content of conjugated dienes were found in walnut and sunflower oils, the increase was 4.7 and 4.3 times, respectively. In poppy seed oil, the content of conjugated dienes increased by 3.7 times. The difference in the rate of development of oxidative processes in oils has been established. In poppy seed oil, the oxidative process started quickly from the first 30 min of exposure to a temperature of 60°C. In olive oil, high levels of conjugated dienes were recorded after 120 min of hyperthermia. The most stable oils to the process of thermal oxidation were olive, almond and sesame oils, which have a high content of oleic acid. Poppy seed oil, walnut oil and sunflower oil recorded the highest absorption values at 234 nm.

Thermal oxidation process in the case of walnut oil was determined to be the most aggressive, while the content of conjugated dienes increased throughout the entire period of the experiment.

Natural astaxanthin in the composition of vegetable oils slowed down the process of thermal oxidation of oils, which in the case of olive oil was determined after 180 min at a temperature of 60°C. The content of conjugated dienes in olive oil with AXT increased by 32% or 1.3 times compared to native oil under identical conditions. The content of conjugated dienes in sesame, almond and walnut oils was significantly reduced by 30-34% with the addition of AXT. The strong antioxidant effect of astaxanthin was found in the case of poppy seed oil, for which the formation of conjugated dienes was reduced by 42%. In this case, the oxidative process was noticeably delayed by 60 minutes when exposed to high temperatures compared to native oil subjected to the same experimental conditions. In the case of sunflower oil, which had a high percentage of thermal oxidation, the addition of AXT reduced the formation of conjugated dienes by 22% during the course of the experiment.

Natural astaxanthin, being a microalgae-derived bioactive compound, showed protective antioxidant properties for vegetable oils subjected to oxidation at high temperatures. This effect was more pronounced in oils with a high content of oleic acid. In the case of polyenoic vegetable oils containing predominantly C 18:2 and C 18:3 fatty acids, lower absorbance values characteristic of conjugated dienes indicated the presence of the antioxidant effect of AXT, which was manifested in the ability to annihilate free radicals.

The study revealed the antioxidant potential of AXT and its ability to stop the oxidation of vegetable oils under high temperature conditions. In conclusion, astaxanthin is a potent antioxidant for thermal protection of vegetable oils.