THE IODINE INDEX EVOLUTION OF SOME NONREFINED OILS, UNDER THE INFLUENCE OF STORAGE CONDITIONS

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This work tries to evidence, comparativelly, the evolution of the iodine index of some maize and sunflower nonrefined oil samples stored under certain conditions (temperature, light, addition of carroten) during 60 days. The material for experiment was represented by raw oil samples, whose iodine index has been determined at once after processing, as well as at 5, 30 and 60 days of keeping at +4ºC (in dark) and at +20-22ºC (in dark and light). Beside thermal and light regime, in some oil samples has been also used an addition of carroten (10% carrot fresh juice) to evidence if these provitamins have an antioxydant role. The analyse of iodine index values in all samples stored 5, 30 şi 60 days, under above mentioned conditions, has evidenced the least decrease of this index in samples stored at +4°C, and the highest ones in samples kept at +20-22°C, 60 days, in light conditions and with carroten addition. 30 days of storage at +20-22°C has led to very close values of iodine index in the both types of oil. After 60 days, this index has registered higher values (a less decrease) in sunflower oil kept in dark conditions. After 60 days of exposure to light, the sunflower crude oil has registered a more marked decrease of iodine index than maize oil. The carroten addition, to avert or to slow down the oxydation process of fatty acids from the both types of oils, has had good results only at +4°C, and less at +20-22°C, under dark conditions.

Key words: *Iodine index, carroten, sample, nonrefined oil*

The lipids from food raw materials can suffer modifications, which, depending on processing and storage conditions, can be: *lipolyse*, when mainly act enzymes from tissues and those ones produced by micoorganisms, *oxidation*, produced through microorganisms action (β-oxidation of short chain fatty acids) or through air oxygen (autooxidation or aldedydic rancidation) with peroxydes formation, and *thermal degradation* in the presence of oxygen [8,1,6,5,4,2].

The autooxidation of unsaturated fatty acids from vegetable oils resulting hydroperoxydes and/or peroxydes is a process due to some chemical, photochemical or microbiological factors, where the presence of oxygen is decisive. Being the first stage of the rancidation process, which makes, finally, the produce to get unpleasant taste and odour, this oxidation can be interrupt through addition of some antioxidative substances, such as: vit. E, carrotenoids, quinons, phenols etc. [6].

Knowing there is an inversely proportional relationship between oxidation degree of fatty acids and iodine index value of those ones, in this work it has studied, comparatively, the iodine index evolution of some samples from maize and sunflower nonrefined oils, stored under certain conditions (temperature, lighting, antioxydants) during 60 days.

MATERIAL AND METHOD

The material of experience was represented by maize and sunflower nonrefined oil samples, whose iodine index was determined at once after obtaining (table 1), as well as at 5, 30 and 60 days of keeping under certain conditions.

Table 1

The iodine index values of maize and sunflower fresh nonrefined oils

Determination	Iodine index (g iodine at 100 g fat))	
Produce	Maize oil	Sunflower oil
Values	98,5	101

Some oil samples coming from the both seed species have been stored at +4ºC (in dark) and others at +20-22ºC (in dark and light). Beside thermal and lighting conditions, in some samples there were used carrotens, to evidence if these provitamins play an antioxidative role within all conditions of our experiment. As carrotens source it was used carrots fresh juice, whose volume was 10% beside oil quantity from respective sample. These samples with carroten addition have been subjected 3 minutes to strong shakes, from hour to hour (during the day time).

The determination of iodine index was made using Hanus method, based on iodine addition (come from iodine monobromide) to double links of fatty acids from oils, the iodine excess being then titrated with $Na_2S_2O_3$ in the presence of starch [3,7].

RESULTS AND DISCUSSIONS

The *table 2* reproduces the iodine index values of maize oil samples.

Table 2

Maize oil iodine index values (g iodine at 100g fat) at certain time intervals

Thermic regime	+4ºC		+20-22ºC			
Lighting regime	Dark		Dark		Light	
Addition Time intervals*	CF	C	CF	C	CF	C
5 days	98,0	98,0	95,8	97,8	92,7	90,2
30 days	97,8	98,2	89,5	93,6	85,4	80,1
60 days	96,3	97,1	84,4	86,3	78,2	75,2

CF = Carroten free samples; C = Samples with carrotens; * = Time intervals of determination

In maize nonrefined oil, the iodine index has registered decrease more or less marked, depending on storage conditions.

After 5 days of storage, the values of this index (very close to fresh sample value) have reduced from 98 g iodine at 100g fat (in samples kept at +4°C) to 90,2 g iodine at 100g fat (in oil kept at +20-22°C, with carroten addition).

After 30 days of storage, the iodine index has continued to decrease a little in oil kept at + 4°C, and more in oil samples kept at +20-22°C. In this last case, there were differences both between samples kept in dark and samples exposed to light, and between samples with carroten and those ones without carroten addition. The least values of iodine index have registered samples exposed to light, and between those ones, the samples with carroten addition.

After 60 days of storage, the maize oil iodine index has decreased both in refrigerated samples and in those ones kept at room temperature. Thus, the least decrease of this index have been in samples stored at +4°C, and the highest decrease have been in samples kept at +20-22°C. At the last temperature of storage it has reached minimum value of 75,2 g iodine at 100g fat (in oil with carroten addition and exposed to light).

The iodine index value decreases in fats whose unsaturated fatty acids sufferes an oxidation process, having as result formation of oxygen links, which makes impossible the addition of iodine atoms to unsaturated carbon atoms within fat molecule. Being an indicator of fatty acids oxidation in lipids, the iodine index has decreased so much the more as storage conditions have been more favourable to oxidation process namely the presence of light and high temperature.

The *table 3* reproduces the iodine index values of sunflower oil samples.

Table 3

Sunflower oil iodine index values (g iodine at 100g fat) at certain time intervals

Thermic regime	+4ºC		+20-22ºC			
Lighting regime	Dark		Dark		Light	
Addition Time intervals*	CF	C	CF	C	CF	C
5 days	101	98,5	95,3	98,5	90,3	88,0
30 days	98,5	100	93,1	97,3	84,7	80,3
60 days	97,3	99,8	86,2	92,5	75,1	69,5

CF = Carroten free samples; C = Samples with carrotens; * = Time intervals of determination

As seen in the table, in sunflower unrefined oil the iodine index has also registered decrease more or less marked, depending on storage conditions.

After 5 days of storage, the values of this index (identical or very close by fresh sample value) have reduced from 101 g iodine at 100g fat (in samples kept at +4°C) to 88 g iodine at 100g (in oil samples kept at +20-22°C, with carroten addition).

After 30 days of storage, the iodine index has continued to decrease a little in oil kept at + 4°C, and more in oil samples kept at +20-22°C. In this last case, there were differences both between samples kept in dark and samples exposed to light, and between samples with carroten and those ones without carroten addition. The

least values of iodine index have registered samples exposed to light, and between those ones, the samples with carroten addition

After 60 days of storage, the sunflower oil iodine index has decreased both in refrigerated samples and in those ones kept at room temperature. Thus, the least decrease of this index have been in samples stored at +4°C, and the highest decrease have been in samples kept at +20-22°C. At the last temperature of storage it has reached minimum value of 69,5 g iodine at 100g fat (in oil with carroten addition and exposed to light).

The carrotens addition, whose purpose was to prevent or to slow down the oxidation process of fatty acids within the both types of oil, has had good results only in samples kept +4°C and less at +20-22°C, in dark conditions

In fig. 1 and 2 are reproduced, comparatively, the iodine index values of maize and sunflower nonrefined oils after 30 and 60 days of storage at +20-22°C.

30 days of storage at +20-22°C has made iodine index to registrate very close values in the both types of oil (*fig. 1*). After 60 days, the iodine index has had higher values in sunflower oil samples (kept in dark), and through exposure to light the same oil has registrated greater decrease than maize (*fig. 2*). The values of this index show a greater sensitivity to the extended action of light (combined with temperature) of sunflower unrefined oil as compared to nonrefined maize oil.

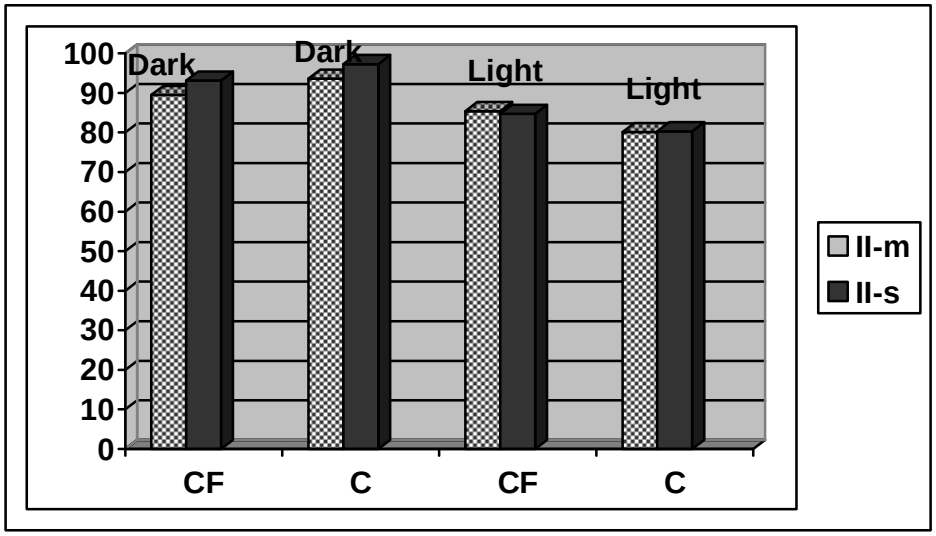

Figure 1 **The iodine index values of oil samples stored 30 days at +20-22°C:** II-m = iodine index of maize oil samples; II-s = iodine index of sunflower oil samples; CF = carroten free samples; C = samples with carroten.

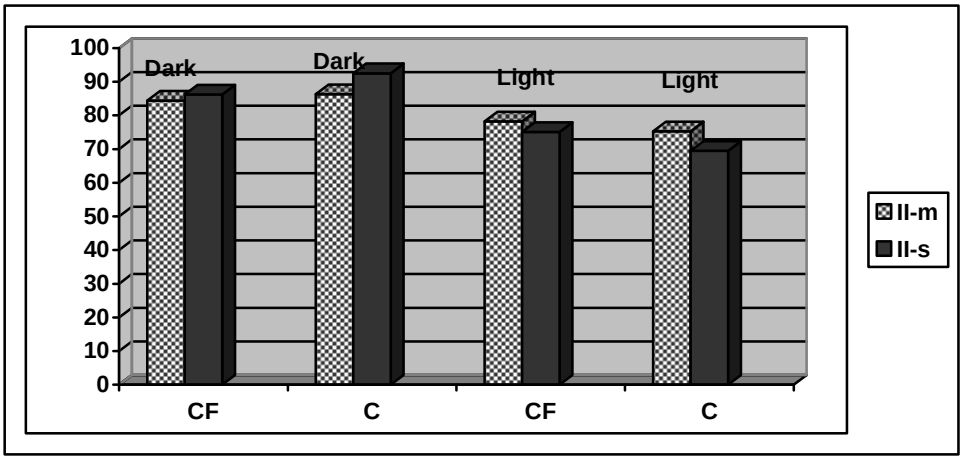

Figure 2 **The iodine index values of oil samples stored 60 days at +20-22°C:**
II-m = iodine index of maize oil samples; II-s = iodine index of sunflower oil samples;
CF = carroten free samples; C = samples with carroten

CONCLUSIONS

1. The study of some samples of maize and sunflower nonrefined oils stored 60 days under various conditions (at +4°C / +20-22°C, in light / dark, with / without carroten addition) has shown some modifications of the peroxyde index determined at certain time intervals, depending on thermal regime, presence of light, carrotens or combination between these factors.

2. During storage under above mentioned conditions, it has ascertained (in the both types of oils) a progresive decrease of iodine index values, depending on storage conditions and length of storage period. The least reductions of the iodine index values have been in samples stored +4°C, and the highest decrease of this index have been in samples kept at +20-22°C, during 60 days, in light and with carroten addition.

3. After 30 days of storage at +20-22°C the iodine index has registered very close values in the both types of oils, but after 60 days this index has had higher values (a less decrease) in sunflower nonrefined oil, kept in dark conditions. After 60 days of exposure to light, the sunflower oil has registered a more marked reduction of iodine index values than maize oil.

4. The carroten addition, whose purpose was to prevent or to slow down the fatty acids oxidation process within composition of maize and sunflower nonrefined oils, has had good results only in samples kept at +4°C and less at +20-22°C, in dark conditions.

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