RESEARCH ON SENSORIAL AND PHYSICAL-CHEMICAL FEATURES OF SOME CORN OIL ASSORTMENTS SOLD ON IAŞI CITY MARKET

CERCETĂRI PRIVIND CARACTERISTICILE SENZORIALE ŞI FIZICO-CHIMICE ALE UNOR SORTIMENTE DE ULEI DE PORUMB COMERCIALIZATE PE PIAŢA MUNICIPIULUI IAŞI

AVARVAREI B.V.[1], NISTOR C.E.[1*], HOHA G.V.[1]
[*]Corresponding author e-mail: is_cata@yahoo.com

Abstract. *Corn oil is a food consumed by Romanian peoples, because have a varied range of utilisations, and consumed in moderate quantities is beneficial to human organism. The current paper aimed to establish the main quality characteristics of corn oils sold on Iaşi City market and their comparison in according with the values of actual standards. Corn oil samples gathered from three different producers (A, C, F) were achieved from Iaşi City market. The determined physical-chemical properties for the analysed assortments of corn oil were: humidity, density, acidity value, iodine value, saponification value, and peroxide value.*
Key words: corn oil, assortments, quality features

Rezumat. *Uleiul de porumb este un aliment consumat de români, deoarece prezintă o gamă variată de metode de utilizare, şi consumat în cantităţi moderate este benefic organismului. Această lucrare are ca scop evidenţierea principalelor caracteristici de calitate a uleiurilor de porumb de pe piaţa municipiului Iaşi şi compararea rezultatelor cu valorile STAS în vigoare. Probele de ulei de porumb de la trei producători diferiţi (A, C, F) au fost achiziţionate de pe piaţa municipiului Iaşi. Proprietăţile fizico-chimice ale sortimentelor de ulei analizate au fost reprezentate de următoarele determinării: umiditate, densitatea relativă, indicele de aciditate, indicele de iod, indicele de saponificare, şi indicele de peroxid.*
Cuvinte cheie: ulei, sortimente, caracteristici de calitate

INTRODUCTION

Edible oils are part of our daily diet, which provide energy, essential fatty acids and serve as a carrier of fat soluble vitamins (Dorobanţu and Beceanu, 2008; Latif and Anwar, 2009; Zahir *et al.*, 2017). Corn oil, obtained from seeds of *Zea mays*, is an important component usually used as food and pharmaceutical formulations such as in suspensions and emulsions (Alvarez and Rodriguez, 2000).

Different sensorial, physical and chemical features of edible oil are used to describe and monitor the compositional quality of oils (Ceriani *et al.*, 2008; Mousavi *et al.*, 2012; Zahir *et al.*, 2017; Nistor and Hoha, 2017). This physicochemical

[1]University of Agricultural Sciences and Veterinary Medicine Iaşi, Romania

parameter includes iodine value (IV), saponification value (SV), viscosity, density and peroxide value (PV). Edible oils are one of the main constituents of the diet used for cooking purposes (Nistor and Hoha, 2013).

The advantages of using corn oil in human nutrition are justified by its high content in poly and monounsaturated fatty acids, thus helping to reduce the risk of developing a cardiovascular system, as well as regulating insulin levels (Nistor and Hoha, 2017).

MATERIAL AND METHOD

To complete the current study were achieved 15 bottles with corn oils from different batches, 5 for each studied assortment, and were bought from different stores localised in Iaşi City. Samples provided from three different producers were gathered in original package and transferred to the analysis laboratory.

Sensory evaluation of corn oil samples was conducted by a team of eleven assessors. Respecting a modern working method (Banu *et al.*, 2002; 2007) each of the board members received three coded samples, corresponding for each type of corn oil. Sensory appreciation of the samples was performed using the analytical method of assessing the quality by scoring, using a 5-point system scale for corn oil.

The criteria used for sensory evaluation were overall appearance and colour, taste, and smell. The obtained results are interpreted based on the scoring scale for quality evaluation (Banu *et al.*, 2002; 2007).

Determination of humidity, iodine value and density by pycnometer method was realised in according with standard *STAS 145-67,* which establish the determination methods for humidity, iodine value and density of vegetal oils and fats.

Acidity value represents the quantity, in mg, of potassium hydroxide necessary for neutralization of free fatty acids from one gram of fat material. Method is based on neutralization of free acidity of a certain fat quantity with an alcoholic solution of potassium hydroxide with a well-know titre and factor, in the presence of phenolphthalein.

For determination of saponification value, a known quantity of fat (oil) is subjected to saponification, by boiling with an in excess quantity of potassium hydroxide 0.5 n (alcoholic solution). At the end of saponification it is determined, by titration with an acid, the quantity of potassium hydroxide which didn't react (in excess); through difference is established the quantity of potassium hydroxide which was utilised at fat neutralization and saponification (Gunstone, 2004; Hamm and Hamilton, 2000).

Determination of peroxide value was realised in according with standard *STAS 145-67.* Product is titre in an acetic acid and chloroform environment, with solution of potassium iodide.

RESULTS AND DISCUSSIONS

At the end of sensorial analysis of the three studied oils assortments (fig. 1) and after processing the obtained data, and calculation of the weighed mean score for all the tracked sensorial features, were obtained a total mean score (fig. 2), which show the fact that rank one is occupied by oil F which remarked by: clear

aspect, light yellow colour, characteristic flavour of roasted corn seeds, pleasant taste, characteristic to raw material.

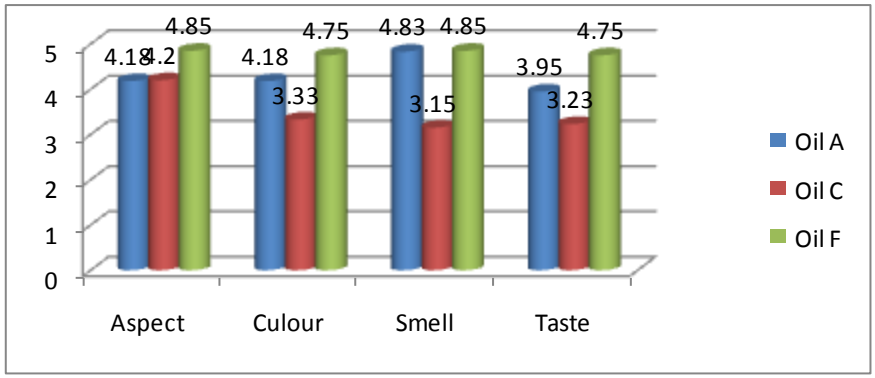

Fig. 1 Graphical representation of the average scores obtained by the analyzed corn oils

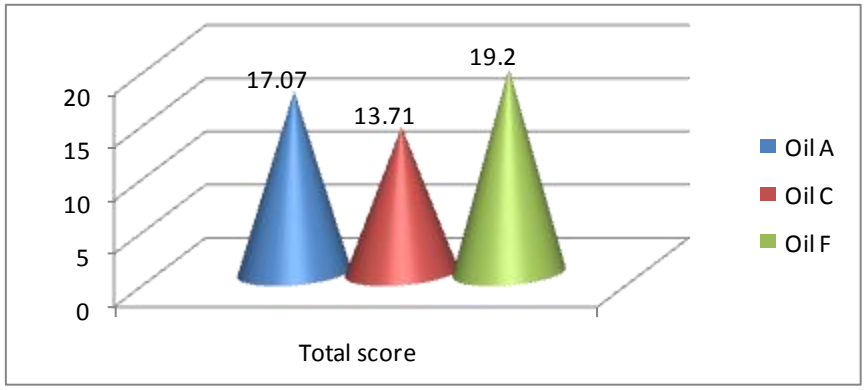

Fig. 2 Graphical representation of the total average scores obtained by the analyzed corn oils

In according with the total mean score of 19.02 points oil F receive the mark ***Very Good***. Rank second in tasters' preferences was oil A with a total mean score of 17.07, assortment characterised by: clear aspect, light-yellow colour; pleasant smell characteristic to roasted seeds; pleasant taste, without strange taste. In according with the score board oil A receive mark ***Good***. Ranked last was oil C with a total mean score of 13.71 points because some sensorial attributes didn't fulfil the tasters' desired conditions. In according with the score this assortment receive mark ***Satisfactory***.

Humidity is a physical-chemical parameter which shows the water content in oil. The analyzes performed on corn oil reported a 0.1203% humidity difference between the C and F assortments, while in the case of oil A we discovered an exceedance of almost 3 times the maximum allowed value. The results are presented in table 1.

Table 1

The results of moisture present in the corn oils (%)

No.	Product			Standard value
	Oil A	*Oil C*	*Oil F*	
1	0.4194	0.2023	0.1141	<0.15%
2	0.4465	0.2156	0.0931	
3	0.4449	0.2581	0.0954	
4	0.4158	0.2248	0.1425	
5	0.4648	0.2088	0.1057	
Average	**0.4373**	**0.2219**	**0.1016**	

Density represents the rate between the mass of a volume of analysed substance and the mass of the same volume of water, at the same temperature. Data obtained are presented in table 2.

Table 2

The results of relative density of corn oils (g/cm^3)

No.	Product			Standard value
	Oil A	*Oil C*	*Oil F*	
1	0.936	0.926	0.920	0.917-0.925 g/cm^3
2	0.938	0.927	0.922	
3	0.936	0.925	0.919	
4	0.937	0.926	0.918	
5	0.936	0.928	0.922	
Average	**0.936**	**0.926**	**0.920**	

From the determinations carried out, there was an exceedance of the standard value in the case of corn oil A. This fact can be correlated with the value of the moisture content obtained in the previous analysis. Also in the case of the C oil assortment, an exceedance of the standard value was also observed.

Acidity value is a physical-chemical parameter which allows us to appreciate the preservation degree of the oils (tab. 3).

Table 3

Acidity value of corn oils (mg KOH/g)

No.	Product			Standard value
	Oil A	*Oil C*	*Oil F*	
1	0.636	0.423	0.120	≤0.2 mg KOH/g
2	0.638	0.421	0.122	
3	0.636	0.423	0.119	
4	0.637	0.423	0.118	
5	0.636	0.424	0.122	
Average	**0.636**	**0.423**	**0.120**	

The differences obtained from the determinations cannot be neglected, indicating a high acidity of the corn oil assortment A 5.3 times higher than the assortment F. Also in the case of corn oil assortment C, the obtained values were double than the maximum levels. The high values of corn oil acidity generally reflect its lower stability and higher susceptibility to rancidity.

Determination of saponification value offers information regarding mean molecular mass of fatty acids from a certain fat. None of the assortments evaluated were within standards. By comparing the three assortments, the corn oil F registered an average value relatively close to the one mentioned by standard. The oil assortment C registered the lowest value of the saponification index of the three analyzed assortments (tab. 4).

Table 4

Saponification value, (mg KOH/1 g oil)

No.	Product			Standard value
	Oil A	*Oil C*	*Oil F*	
1	167	159	180	184-196 mg KOH/1 g
2	173	152	177	
3	170	153	179	
4	171	161	181	
5	169	157	180	
Average	**170**	**156.4**	**179.4**	

The iodine index is a very important analytical constant, being used for the characterization of natural lipids (tab. 5).

Table 5

Iodine values of corn oil samples, (g I_2/100 g)

No.	Product			Standard value
	Oil A	*Oil C*	*Oil F*	
1	127	83	98	103-128 g I_2/100 g
2	123	87	97	
3	120	83	99	
4	121	81	91	
5	119	81	90	
Average	**122**	**83**	**95**	

Analyzes carried out generally revealed small values of the iodine index, which may indicate a possible adulteration of the oil with other oils of vegetable origin. The exception is the corn oil A assortment.

Along with the acidity index, the peroxide index provides very important information on the age and stability of corn oil. Analyzes carried out generally revealed that the results obtained in the case of corn oil samples from assortments A and F fall into the standard limit (tab. 6).

Table 6

Peroxide value of the analyzed corn oils, (10 meq/100 g product)

No.	Product			Standard value
	Oil A	*Oil C*	*Oil F*	
1	9	11	6	≤ 10 meq/100 g product
2	10	17	6	
3	9	13	6	
4	9	8	8	
5	10	8	5	
Average	**9.4**	**11.4**	**7.4**	

As a result of this analysis, it is found that there is some depreciation of the oil samples taken in the analysis, especially in the case of the corn oil assortment C, the results indicating the oxidation of the constituent fatty acids.

CONCLUSIONS

1. The determinations of the main quality indicators for the three assortments of corn oil led, in large part, to inadequate results, in comparison to quality standards.
2.The results obtained from the analyzes carried out thus offer two possibilities to explain the results obtained thus: the oxidation reactions started either before the opening of the bottle, which shows an incorrect handling of the packages, or the oxidation reactions had a rapid unfolding, this last aspect bringing a question mark on product quality.
3. Taking into account the aspects presented above, we recommend to the producers a greater attention on the way of preserving the oil.

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