CODEX ALIMENTARIUS COMMISSION

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Agenda Item 8 **CX/FO 11/22/10**

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CODEX COMMITTEE ON FATS AND OILS

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PROPOSAL TO AMEND THE STANDARD FOR NAMED VEGETABLE OILS

Modification of reference values for Sunflower Seed Oils

(Oleic and Linoleic Fatty Acids and Iodine Value)

Prepared by ARGENTINA

Argentina wishes to request consideration of the amendment to CODEX STAN 210/1999, with a particular focus on certain quality parameters relating to sunflower seed oil.

Argentina wishes to state that oils from traditional sunflower seeds present different fatty acid values, depending on the agro-ecological zone in which they are grown, particularly for oleic and linoleic acid and the ratio between the two.

Thus, in Argentina, sunflower seed oils from traditional crops can have an oleic acid content of more than 50 percent, without that meaning they can be classified as "mid-oleic". Similarly, mid-oleic oil crops can reach values of 72% of this fatty acid, without qualifying as "high oleic".

The analytical data on Argentine traditional oil used for this presentation come from the work by ASAGA I+D: "**Fatty acid composition of sunflower seed oil obtained from certified seeds sown in different zones of the Argentine Republic" – Harvest 2001-2002**. This work comprised 12 certified varieties of traditional sunflower seed, whose oil was extracted in the laboratory and covered 15 different Argentine soils. For each variety, seeds from three sowings were obtained, in different plots per locality, with a total of 441 specimen samples.

Support and matching analytical findings can also be found in the work published by Natalia Izquierdo and Luis Agruirrezabal: "**Fatty acid composition of the oil of sunflower hybrids grown in Argentina. Characterization and modelling**".

The samples were taken from 15 localities situated in the provinces of Chaco, Santa Fe, Entre Rios, Córdoba, La Pampa and Buenos Aires. They correspond to hybrid cultivars recommended for each cropping zone and therefore vary according to the location of the trials. For each trial, each hybrid was sown on plots comprising 3 furrows 6m in length, using the normal methodology for this type of trial.

The experimental design was in the form of blocks, with each trial consisting of three blocks, with a random distribution of hybrids within each block. There were three samples of each hybrid in each locality.

The 441 samples were analysed in duplicate through gas chromatography of their fatty acids, from myristic acid (C14:0) to lignoceric acid (C24:0). The iodine values were calculated from the acid composition.

The average results from all localities for oleic acid and linoleic acid content, iodine value and refractive index are as follows:

	Range
Oleic acid (C 18:1)	16.1-57.9
Linoleic acid (C 18:2)	31.8 – 73.4
Iodine value	104.3 – 140.3
Refractive index	1.4698 – 1.4740

As a result of the above, Argentina has noted inconsistencies in certain quality parameters, leading to "gaps" in the classification ranges for the three types of oil. This is detrimental to the international trade of commodities produced in the country but does not mean that Argentine sunflower seed oil fails to comply with related identity standards.

Argentina has noted the existence of gaps in the classification of OLEIC (18:1) and LINOLEIC (18:2) fatty acids, as is evidenced in TABLE 1 (Standard CODEX STAN 210/1999).

Table 1: Fatty acid composition of vegetable oils as determined by gas liquid chromatography from authentic samples (expressed as percentage of total fatty acids) (see Section 3.1 of the Standard)

Fatty acid	Rapeseed oil	Rapeseed oil (low erucic acid)	Rice bran oil	Safflower-seed oil	Safflowerseed oil (high oleic acid)	Sesame-seed oil	Soyabean oil	Sunflower-seed oil	- Sunflower seed oil (high oleic acid)	- Sunflower seed oil (mid-oleic acid)
C6:0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C8:0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C10:0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C12:0	ND	ND	ND-0.2	ND	ND-0.2	ND	ND-0.1	ND-0.1	ND	ND
C14:0	ND-0.2	ND-0.2	0.1-0.7	ND-0.2	ND-0.2	ND-0.1	ND-0.2	ND-0.2	ND-0.1	ND-1
C16:0	1.5-6.0	2.5-7.0	14-23	5.3-8.0	3.6-6.0	7.9-12.0	8.0-13.5	5.0-7.6	2.6-5.0	4.0-5.5
C16:1	ND-3.0	ND-0.6	ND-0.5	ND-0.2	ND-0.2	ND- 0.2	ND-0.2	ND-0.3	ND-0.1	ND-0.05
C17:0	ND-0.1	ND-0.3	ND	ND-0.1	ND-0.1	ND-0.2	ND-0.1	ND-0.2	ND-0.1	ND-0.05
C17:1	ND-0.1	ND-0.3	ND	ND-0.1	ND-0.1	ND-0.1	ND-0.1	ND-0.1	ND-0.1	ND-0.06
C18:0	0.5-3.1	0.8-3.0	0.9-4.0	1.9-2.9	1.5-2.4	4.5-6.7	2.0-5.4	2.7-6.5	2.9-6.2	2.1-5.0
C18:1	8.0-60.0	51.0-70.0	38-48	8.4-21.3	70.0-83.7	34.4-45.5	17-30	14.0-39.4	75-90.7	43.1-71.8
C18:2	11.0-23.0	15.0-30.0	29-40	67.8-83.2	9.0-19.9	36.9-47.9	48.0 -59.0	48.3-74.0	2.1-17	18.7-45.3
C18:3	5.0-13.0	5.0-14.0	0.1-2.9	ND-0.1	ND-1.2	0.2-1.0	4.5-11.0	ND-0.3	ND-0.3	ND-0.5
C20:0	ND-3.0	0.2-1.2	ND-0.9	0.2- 0.4	0.3-0.6	0.3-0.7	0.1-0.6	0.1-0.5	0.2-0.5	0.2-0.4
C20:1	3.0-15.0	0.1-4.3	ND-0.8	0.1- 0.3	0.1-0.5	ND-0.3	ND-0.5	ND-0.3	0.1-0.5	0.2-0.3
C20:2	ND-1.0	ND-0.1	ND	ND	ND	ND	ND-0.1	ND	ND	ND
C22:0	ND-2.0	ND-0.6	ND-0.5	ND-1.0	ND-0.4	NN-1.1	ND-0.7	0.3-1.5	0.5-1.6	0.6-1.1
C22:1	> 2.0-60.0	ND-2.0	ND	ND-1.8	ND-0.3	ND	ND-0.3	ND-0.3	ND-0.3	ND
C22:2	ND-2.0	ND-0.1	ND	ND	ND	ND	ND	ND-0.3	ND	ND-0.09
C24: 0	ND-2.0	ND-0.3	ND-0.6	ND-0.2	ND-0.3	ND-0.3	ND-0.5	ND-0.5	ND-0.5	0.3-0.4
C24:1	ND-3.0	ND-0.4	ND	ND-0.2	ND-0.3	ND	ND	ND	ND	ND

ND - non detectable, defined as ≤ 0.05%

More specifically, the three classes of oil have "gaps" for these two fatty acids, which complicates the classification of oils that have amounts between these values, which are reproduced below:

Fatty acid	*Sunflower seed oil*	*Sunflower seed oil (mid-oleic acid)*	*Sunflower seed oil (high oleic acid)*
C18:1 – OLEIC	14.0 – **39.4**	**43.1 – 71.8**	**75.0** – 90.7
C18:2 – LINOLEIC	74.0 – **48.3**	**45.3 – 18.7**	**17.0** – 2.1

Inconsistencies have also been noted in the iodine values for these three types of oil, with an "overlap" between sunflower seed oil and sunflower seed oil with mid-oleic acid content, and a "gap" between sunflower seed oil with mid-oleic acid content and sunflower seed oil with high oleic acid.

In addition, the minimum and maximum values of the refractive and density indexes are expressed on the basis of different average temperatures, which makes it difficult to determine the appropriate correlation and/or continuity between levels, and consequently to make comparisons between them since, when calculated at same unit and temperature, the levels do not necessarily correspond with each other or with the respective iodine and saponification values.

Table 2 (Standard Codex STAN 210/1999) presented below shows the discrepant values for relative density and iodine value, as featured in the approved standard, with the discrepant values highlighted underneath:

Table 2: Chemical and physical characteristics of crude vegetable oils (see Appendix of the Standard)

	Palm superoleic	**Rapeseed oil**	**Rapeseed oil (low erucic acid)**	**Rice bran oil**	**Safflower-seed oil**	**Safflower-seed oil (high oleic acid)**	**Sesameseed oil**	**Soyabean oil**	**Sunflower-seed oil**	**Sunflower-seed oil (high oleic acid)**	**Sunflower-seed oil (mid-oleic acid)**
Relative density (x° C/water at 20°C)	0.900-0.925 x=40°C	0.910-0.920 x=20°C	0.914-0.920 x=20°C	0.910–0.929	0.922-0.927 x=20°C	0.913-0.919 x=20°C; 0.910-0.916 x=25°C	0.915- 0.924 x=20°C	0.919-0.925 x=20°C	0.918-0.923 x=20°C	0.909-0.915 x=25°C	0.914-0.916 x=20°C
Apparent density (g/ml)	0.897-0.920					0.912-0.914 at 20°C					
Refractive index (ND 40°C)	1.463-1.465	1.465-1.469	1.465-1.467	1.460 – 1.473	1.467-1.470	1.460-1.464 at 40°C; 1.466-1.470 at 25°C	1.465-1.469	1.466-1.470	1.461- 1.468	1.467- 1.471 at 25°C	1.461- 1.471 at 25°C
Saponification value (mg KOH/g oil)	180-205	168-181	182-193	180 – 199	186-198	186-194	186-195	189-195	188-194	182-194	190-191
Iodine value	≥ 60	94-120	105-126	90-115	136-148	80-100	104-120	124-139	118-141	78-90	94-122
Unsaponifiable matter (g/kg)	≤ 13	≤ 20	≤ 20	≤ 65	≤ 15	≤ 10	≤ 20	≤ 15	≤ 15	≤ 15	≤15

Fatty acids	*Sunflower seed oil*	*Sunflower seed oil (mid-oleic acid)*	*Sunflower seed oil (high oleic acid)*
IODINE VALUE	141 – **118**	**122 – 94**	**90** – 78
RELATIVE DENSITY (at **20°C)**	0.923 – **0.918** x=20°C	**0.916 – 0.914 X=20°C**	**0.915 – 0.909 X=25°C**
REFRACTIVE INDEX (ND 40°)	1.461 – 1.468	1.467 – 1.471 to 25°C	1.461 – 1.471 to 25°C

In order for the standard to have consistent parameters for sunflower seed oil, Argentina suggests the following amendments:

FOR **OLEIC 18:1** FATTY ACID

For sunflower seed oil, Argentina considers that a minimum reference value is not necessary, just the establishment of a specific maximum value. We therefore propose a value of 54.9 expressed as a percentage of total fatty acid content.

For sunflower seed oil (mid-oleic acid), we propose a minimum value of 55.0 and a maximum value of 76.9 expressed as a percentage of total fatty acid content.

For sunflower seed oil (high oleic acid), we propose a minimum value of 77.0 expressed as a percentage of total fatty acid content and considers that a maximum value is not necessary.

FOR LINOLEIC (18:2) FATTY ACID

For sunflower seed oil, Argentina proposes a maximum value of 69.9 and a minimum value of 31.8 expressed as a percentage of total fatty acid content.

For sunflower seed oil (mid-oleic acid content), we propose a maximum value of 31.7 and a minimum value of 17.1 expressed as a percentage of total fatty acid content.

For sunflower seed oil (high oleic acid), we propose a maximum value of 17.0 expressed as a percentage of total fatty acid content and considers that a minimum value is not necessary.

FOR **IODINE VALUE** (expressed in grams of I_2 per 100 grams)

For sunflower seed oil, Argentina proposes a minimum value of 110.0 and a maximum value of 138.0.

For sunflower seed oil (mid-oleic acid), we propose a minimum value of 91.1 and a maximum value of 109.9.

For sunflower seed oil (high oleic acid), we propose a maximum value of 91.0.

FOR **ABSOLUTE DENSITY at 25°C**

Argentina considers that the temperature needs to be standardized for classification value. There is specific evidence of a change in values taken at other temperatures than the reference temperature.

In view of the above, Argentina proposes the following amendments to the RELATIVE DENSITY values measured at 25°C:

For sunflower seed oil, Argentina proposes a minimum value of 0.9133 and a maximum of 0.9173.

For sunflower seed oil (mid-oleic acid), we propose a minimum value of 0.9106 and a maximum of 0.9132.

For sunflower seed oil (high oleic acid), we propose a maximum value of 0.9105.

The following table summarizes the proposed amendments:

Fatty acid	*Sunflower seed oil*	*Sunflower seed oil (mid-oleic acid)*	*Sunflower seed oil (high oleic acid)*
C18:1 – OLEIC	**Max. 54.9**	**55.0 – 76.9**	**Min. 77.0**
C18:2 – LINOLEIC	**31.8 – 69.9**	**17.1 - 31.7**	**Max. 17.0**
IODINE VALUE (gr. I_2/100 gr.)	**110.0 – 138.0**	**91.1 – 109.9**	**Max. 91**
ABSOLUTE DENSITY (at **25°C)**	**0.9133 – 0.9173 X=25°C**	**0.9106 – 0.9132 X=25°C**	**Max. 0.9105 X=25°C**