



JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON FATS AND OILS

Twenty-fourth Session

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DISCUSSION PAPER ON COLD PRESSED OILS

(Prepared by an Electronic Working Group led by Iran)

INTRODUCTION

1. The 22nd Session of the Codex Committee on Fats and Oils (CCFO) (Penang, Malaysia, 21-25 February 2011) agreed to establish an electronic working group (EWG) on cold pressed oils led by Iran. Participants from Argentina, Australia, Brazil, Canada, Chile, Ecuador, Germany, Malaysia and the United States of America joined. Iran reviewed all related documents and prepared the basic structure for the proposed standard which was sent to participants of EWG for comments and presented in the CCFO23.

2. CCFO23 (Langkawi, Malaysia, 25 February -1 March 2013) noted that 5 out of the 9 types of oils proposed were already present in the *Standard for Named Vegetable Oils* (CODEX STAN 210-1999). These were peanut oil, sesame oil, sunflower seed oil, maize oil and safflower oil. The Committee therefore noted that further consideration on these five oils.

3. CCFO23 agreed to change the scope of the discussion paper to cover walnut oil, almond oil, hazelnut oil, pistachio oil, flaxseed oil and avocado oil. CCFO also agreed to establish an EWG, chaired by Iran and working in English only, to revise the discussion paper including a project document, taking into account comments made at the session and based on the *Guideline for Application of the Criteria for the establishment of Work Priorities Applicable to Commodities* and information as required by the CCFO when proposing the addition of new oils to the *Standard for Named Vegetable Oils* agreed by CCFO16, for consideration at the next session.

4. The members of the EWG were Argentina, Brazil, Canada, Chile, Dominican Republic, Ecuador, France, India, Islamic Republic of Iran, Italy, Malaysia, Poland, Republic of Korea, Russia, Spain, Thailand, United Kingdom and The United States Of America. The EWG also prepared proposed amendment to the *Standard for Named Vegetable Oils* (CODEX STAN 210-1999) to include walnut oil, pistachio oil, almond oil, hazelnut, avocado oil, and flaxseed oil for reference (see Appendix 2).

BACKGROUND

5. Cold pressing is the traditional and natural way to produce oil. Oil is simply gently squeezed out of the seed at temperatures below 50°C which ensures that the full essence and character of the oil is preserved. No external heat is applied and no external heat is produced in modern processes. The heat is produced because of the pressure and rotational friction. Nearly all cold pressed oils are a natural source of Vitamin E, an important antioxidant, beneficial to general wellbeing. Most oils also contain the Essential Fatty Acids commonly known as Omega 3 and 6. These products, which are just cold pressed and filtered, result in oils that are naturally free from trans fats and full of natural antioxidants. Consumption of more healthy foods like cold pressed oil is being raised in the different countries. As a result, productions of these kinds of oils have a significant positive growth in recent years. In Iran like other many countries with a long history. Cold pressed oils were used for years. There are more than 20 cold pressed oil production units in Iran which are active now. It is also a well known and established industry in European countries as well as India, Pakistan, and South America and many other areas.

Summary of Discussion

6. Argentina, Brazil, Canada, Chile, Dominican Republic, Ecuador, France, India, Islamic Republic of Iran, Italy, Malaysia, Poland, Republic of Korea, Russia, Spain, Thailand, United Kingdom and the United States of America provided comments to the EWG. Major observations and comments provided were as follows:

the EWG focused on the *Standard for Edible Fats and Oils not covered by Individual Standards* (CODEX STAN 19-1981).also suggested change the scope of the discussion paper to cover walnut oil, almond oil, hazelnut oil, pistachio oil, flaxseed oil and avocado.

The EWG on cold pressed oils considered the *Standard for Named Vegetable Oils* (CODEX STAN 210-1999) and revised the discussion paper including a project document, taking into account comments made based on the *Guideline for Application of the Criteria for the Establishment of Work Priorities Applicable to Commodities* and information by participation members and added walnut oil, pistachio oil, almond oil, hazelnut, avocado oil, and flaxseed oil for reference (see Appendix 3).

CONCLUSION

7. The Committee is invited to consider the issues raised in the discussion paper and recommend that the 38th Session of the Codex Alimentarius Commission to approve new work on the review of the *Standard for Named Vegetable Oils*(CODEX STAN 210-1999) to include walnut oil, pistachio oil, almond oil, hazelnut oil, avocado oil, and flaxseed oil (see project document in Appendix 1)

APPENDIX 1

**PROJECT DOCUMENT FOR AMENDING THE STANDARD FOR NAMED VEGETABLE OILS
(CODEX STAN 210-1999)**

1. Purpose and Scope of the Proposed Work

The objective of this proposal is to set quality and purity as well as food safety criteria for cold pressed oils to facilitate the condition for its commercialization.

2. Its Relevance and Timeliness

Cold pressed oils are one of the oldest types of edible oil consumed by the human kind. They have been traditionally produced and consumed in Middle Eastern countries, Africa, Europe and South America for years. In recent years consumption of more healthy food being raised, many people believe that cold pressed oils are healthier because do not undergo chemical refining treatment and contains beneficial components as well. Cold pressed oils contain natural tocopherols and polyphenols as well as other beneficial constituents.

3. Main aspects to be covered as follow:

The main aspect to be covered is revising, Definition of cold pressed oils, Quality and compositional characteristic, Contaminants and related food safety issues, Organoleptic Characteristics, Food additives, Labelling, Analytical methods and edible oil seeds and nuts which are not covered by CODEX STAN 210-1999 with regard to global data.

4. An Assessment against the *Criteria for the Establishment of Work Priorities***General criterion:**

(a) Consumer protection from the point of view of health, food safety, ensuring fair practices in the food trade and taking into account the identified needs of developing countries.

The proposed new standard will meet this criterion by:

- Promoting consumer protection and the prevention of fraudulent practices.
- Providing greater assurance of the quality of the product to meet consumer needs and the minimum requirements for food safety.
- Arriving at levels of standardization based on the properties of different varieties to meet industrial and consumer needs with exactness and credibility.

In addition, the elaboration of the standard would be to the benefit of many countries in particular developing countries, which are the major producers, exporters, and consumers of vegetable oils.

(b) Volume of production and consumption in individual countries and volume and pattern of trade between countries.

There is no document available which provides global statistic for cold press oil production, however it is estimated the production volume of cold pressed oil is between 2-3 % total vegetable oil production.

Table 1-Global Production of Vegetable oils

Element	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
Total Production of Vegetable Oils Million Metric Ton	133.76	140.48	147.82	155.71	156.96

Ref: USDA Foreign Agriculture Service Circular Series-Oilseeds-Feb 2013

Also world production statistic for major tree nut oils as follow. It is obvious that there is a big potential for the production of Nut oils as cold pressed oils.

Crop	Element	Value in tonne
Hazelnuts, with shell	Production	914447
Pistachios	Production	1005436
Linseed	Seed	92535.52
Avocados	Production	4360018.28
Walnut with shell	Production	3418559.00
Almond with shell	Production	1934817.00

Data from the U.N. Food and Agriculture Organization's FAOSTAT database 2012

(c) Diversification of national legislation and apparent resultant or potential impediments to international trade

The nutritional factors of vegetable oils are very important for human consumption. By the physicochemical characteristics of the oil, especially the content of fatty acids, these oils is emphasized.

Also this amendment promote related national standards and it is an opportunity for food industries especially in developing countries and will determine authentic parameters and criteria for vegetable oils that increase food integrity approach and prevention of fraud.

(d) International or regional market potential

By this amendment to the standard as mentioned potential for both of international and regional markets will be increased

(e) Amenability of the commodity to standardisation

The addition of oils to CODEX STAN 210-1999, to include essential factors related to composition, health and quality would enable the standardization of oils of this type and contribute to consumer protection

5. Relevance to other codex strategic objectives

The new work proposed would contribute to ensuring fair practices in the international trade in cold press oils, taking into account the needs and special concerns of all countries, by satisfying the following strategic objectives and priorities elaborated in Codex Alimentarius Commission: Strategic Plan 2014-2019

Goal 1: Establish international food standards that address current and emerging food issue: Develop and revise international standards, in response to needs identified by Members and in response to factors that affect food safety, nutrition and fair practices in the food trade.

Developing more globally representative Codex standards will help to ensure their widest adoption by member countries, minimising the potential negative effects of technical regulations on international trade by ensuring that they do not act as technical barriers to trade.

Goal 2: Ensure the application of risk analysis principles in the development of Codex standards.

The proposed work will promote the development of Codex commodity standards based on rigorous scientific analysis of data collected from all regions of the world, so that the compositional parameters are globally relevant.

Goal 4: Implement effective and efficient work management systems and practices:

Codex and member countries will continue to work closely and analyse data and develop more globally applicable requirements in the Codex.

The proposed work will promote the elaboration of Codex commodity standards based on the rigorous scientific analysis of collected data.

The proposed amendment to CODEX STAN 210-1999 will facilitate fair trade of cold pressed oils, as the Quality and purity parameters and also food safety regarding these kind of oils are not covered by existing standards regulated by Codex are considered thus reflecting the existing world variations; also, this will Guarantee the purity of oils being produced by this method, allow for their proper classification, and provide proper criteria for the quality control of these products.

6. Information on the relation between the proposal and other existing Codex documents

None.

7. Identification of any requirement for and availability of expert scientific advice

None.

8. Identification of any need for technical input to the guideline from external bodies that can be planned

None.

9. Proposed timeline for completion of the new work , including the start date, proposed date for adoption at step 5/8 , and the proposed date for adoption by the completion.

Consideration of the Discussion Paper and Project Document- CCFO24 (February 2015)

New work Approved by Commission – CAC38 (July 2015)

Consideration of the Amendment – CCFO25 (2015)

Adoption at Step 5/8 – CAC40 (July 2017)

APPENDIX 2

Proposed Amendments to the Codex Standards for Named Vegetable Oils (CODEX STAN 210 – 1999)

1. Add following definitions under Sub-section 2.1 Product Definitions.

- Almond oil is derived from kernel of almond fruit (*Amygdalus communis* L).
- Avocado oil is derived from avocado fruit (*Persea americana*).
- Flaxseed (Linseed oil) oil is derived from the seeds of various cultivated species of (*Linum usitatissimum*)
- Hazelnut oil is derived from kernel of hazelnut fruit (*Corylus avellana* L.).
- Pistachio oil is derived from kernel of pistachio fruit (*Pistacia vera* L.).
- Walnut oil is derived from kernel of walnut fruit (*Juglans regia* L.).

2. Add following table in Table 1 Fatty acid composition of vegetable oils as determined by gas liquid chromatography from authentic samples 1 (expressed as percentage of total fatty acids)

Fatty acid	Almond oil	Hazelnut oil	Pistachio oil	Walnut oil	Flaxseed	Avocado oil
C6:0	ND	ND	ND	ND	ND	ND
C8:0	ND	ND	ND	ND	ND	ND
C10:0	ND	ND	ND	ND	ND	ND
C12:0	ND	ND	ND	ND	ND	ND
C14:0	ND	0,0-0,1	0,0--0,6	ND	ND	0,0-0,3
C16:0	4,0--13,0	4,0--9,0	8,0--13,0	6,0--8,0	4,0-13,0	7,0-35,0
C16:1	0,2----0,6	0,1----0,3	0,5----1	0,1----0,2	0,0-0,5	2,0 – 16,8
C17:0	ND	ND	ND	ND	ND	0,0-0,3
C17:1	ND	ND	ND	ND	ND	0,0-0,3
C18:0	2,0-10,0	1,0-4,0	0,5----2,0	1,0-3,0	2,0-5,0	0,0- 1,5
C18:1	43,0-80,0	66,0-85,0	45,0-70,0	13,0-21,0	10,0-34,0	36,0-80,0
C18:2	15,0-34,0	5,7----25,0	16,0-37,0	54,0-65,0	12,0-18,0	6,0 – 21,2
C18:3	ND	0----0,2	0,1----0,4	13----14	35,0-71,0	0,0-3,0
C20:0	0,1--0,5	0,0-0,3	0,0-0,3	0,0-0,1	0,0-0,2	0,0-0,5
C20:1	0,0--0,3	0,1--0,3	0,0--0,6	0,0--0,2	0,0-0,6	0,0-0,2
C20:2	ND	ND	ND	ND	ND	ND
C22:0	ND	ND	ND	ND	ND	ND
C22:1	ND	ND	ND	ND	0,0-1,0	ND
C22:2	ND	ND	ND	ND	ND	ND
C24:0	ND	ND	ND	ND	ND	0,0-0,1
C24:1	ND	ND	ND	ND	ND	ND
C18:1t	≤0,1	≤0,1	≤0,1	≤0,1	≤ 0,05	ND
C18:2 t + C18:3 t	≤0,1	≤0,1	≤0,1	≤0,1	≤ 0,05	ND

3. Add following table in Table 2 Chemical and physical characteristics of crude vegetable oils (see Appendix of the Standard.

	Almond oil	Hazelnut oil	Pistachio oil	Walnut oil	Flax/linseed oil	Avocado
Relative density (x° C/water at 20°C)	0,910---0,916 25°C/water 25°C	0,908---0,915	0,919----0,20 15,5°C/water 15,5°C	0,923----0,925 25°C/water 25°C	0,925----0,935 20°C/water25°C	0,910---- 0,920 25°C/water 25°C
Apparent density (g/ml)						
Refractive index (ND 40°C)	1,462---1,466	1,456--- 1,474	1,460---- 1,466	1,469----1,471	1,4720-1,4750	1,465---- 1,474
Saponification value (mg KOH/g oil)	188---200	188----197	189----195	189----197	187----197	177----198
Iodine valu	85----106	80----100	84----115	135----165	170----203	63----95
Unsaponifiable matter (g/kg)	≤20	≤10	≤20	≤25	≤20	≤120

APPENDIX 3

**Information on walnut oil, pistachio oil, almond oil, hazelnut, avocado oil and flaxseed oil
(for reference)**

FATTY ACIDS

Fatty acid	Almond oil	Hazelnut oil	Pistachio oil	Walnut oil	Flaxseed	Avocado oil
C6:0	nd	nd	nd	nd	nd	nd
C8:0	nd	nd	nd	nd	nd	nd
C10:0	nd	nd	nd	nd	nd	nd
C12:0	nd	nd	nd	nd	nd	nd
C14:0	nd	0,0-0,1	0,0--0,6	nd	nd	0,0-0,3
C16:0	4,0--13,0	4,0--9,0	8,0--13,0	6,0--8,0	3,0-13,0	7.0-35.0
C16:1	0,2----0,6	0,1----0,3	0,5----1	0,1----0,2	0,0-0,5	2.0 – 16,8
C17:0	nd	nd	nd	nd	nd	0,0-0,3
C17:1	nd	nd	nd	nd	nd	0,0-0,3
C18:0	2.0-10,0	1,0-4,0	0,5----2,0	1,0-3,0	2.0-8,0	0,0- 1,5
C18:1	43,0-80,0	66,0-85,0	45,0-70,0	13,0-21,0	10,0-35,0	36,0-80,0
C18:2	15,0-34,0	5,7----25,0	16,0-37,0	54,0-65,0	11,0-24,0	6,0 – 21,2
C18:3	nd	0----0,2	0,1----0,4	13----14	35,0-71,0	0,0-3,0
C20:0	0,1--0,5	0,0-0,3	0,0-0,3	0,0-0,1	0,0-1,0	0,0-0,5
C20:1	0,0--0,3	0,1--0,3	0,0--0,6	0,0--0,2	0,0-1,0	0.0-0,2
C20:2	nd	nd	nd	nd	nd	nd
C22:0	nd	nd	nd	nd	nd-0.2	nd
C22:1	nd	nd	nd	nd	0,0-1,0	nd
C22:2	nd	nd	nd	nd	nd	nd
C24:0	nd	nd	nd	nd	nd-1.5	0,0-0,1
C24:1	nd	nd	nd	nd	nd	nd
C18:1t	≤0,1	≤0,1	≤0,1	≤0,1	≤ 0,05	nd
C18:2 t + C18:3 t	≤0,1	≤0,1	≤0,1	≤0,1	≤ 0,05	nd

Quality criteria	Maximum level
Matter volatile at 105 Degree centigrade	0,2 % m/m
Insoluble impurities	0,05% m/m
Anisidine value	< 2
Peroxide value	Up to 15 meq O ₂ /kg oil
Acid value	Up to 2 mg KOH/ g oil for avocado oil. Up to 4 mg KOH/ g oil for other cold pressed oils.
Soap content	0,0 mg/kg
Cu	0,4mg/kg
Fe	5mg/kg

BRAZIL COMMENTS:

Brazil suggests that when this proposal is presented, the database used to establish the acid value and soap content should be explained since they are different from the values defined for virgin oils in Codex Stan 210----1999.

PHYSIOCHEMICAL CHARACTERISTICS

oil	specification	Non saponifiables mater (g/kg)	Iodine value	Saponification value (mg KOH/g oil)	Refractive index (ND 40°C)	Density (x°C/water °C)
Almond		≤20	85----106	188----200	1,462----1,466	0,910----0,916 25°C/water 25°C
Hazelnut		≤10	80----100	188----197	1,456----1,474	0,908----0,915
Pistachio		≤20	84----115	189----195	1,460----1,466	0,919----0,20 15,5°C/water 15,5°C
Walnut		≤25	135----165	189----197	1,469----1,471	0,923----0,925 25°C/water 25°C
Avocado		≤120	63----95	177----198	1,465----1,474	0,910----0,920 25°C/water 25°C
Flaxseed		≤20	170----203	187----197	1.4720-1.4750	0,925----0,935 20°C/water25°C

STEROLS*Sterol Composition of Hazelnut oil*

Sterols	%, m/m
Cholesterol	ND-0.6
Brassicasterol	ND
Campesterol	4.0-5.8
Stigmasterol	07-1.5
B-Sitosterol	82.8-86.8
Delta-5-Avenasterol	2.0-4.5
Delta-7-Stigmasterol	0.3-2.3
Delta-7-Avenasterol	0.2-1.1
Total (mg/kg)	1147-2319

Sterol	Walnut oil	Pistachio oil	Hazelnut oil	Almond oil	Avocado oil
cholesterol	nd	nd	nd	nd	0,3
Brassicasterol	nd	nd	nd	nd	----
Campesterol	4----6	4----6	4----6	2----4	6,6
Stigmasterol	n,d	1----3	0---2	1----2	1,5
Beta----sitosterol	85----92	75----79	90----96	80	71,8
Delta----5----avenasterol	4----6	6----8	1----3	10----12	7
Delta----7----stigmasterol	nd	0---2	nd	1----2	----
Delta----7----avenasterol	nd	nd	nd	1----2	----
Others	nd	nd	nd	nd	22,8
Total sterols (mg/kg)	1760	2010	1200	2660	4640

Sterol	Walnut oil	Pistachio oil	Hazelnut oil	Almond oil	Avocado oil
cholesterol	nd	Nd	nd	Nd	1----2
Brassicasterol	nd	Nd	nd	Nd	
Campesterol	4----6	4----6	4----6	2----4	5----12
Stigmasterol	n,d	1----3	0---2	1----2	1----10
Beta----sitosterol	85----92	75----79	90----96	80	60----92
Delta----5----avenasterol	4----6	6----8	1----3	10----12	2----10
Delta----7----stigmasterol	nd	0---2	nd	1----2	1----2
Delta----7----avenasterol	nd	Nd	nd	1----2	1----2
Others	nd	Nd	nd	Nd	
Total sterols (mg/kg)	1760	2010	1200	2660	3500----5600

Sterol	Walnut oil	Pistachio oil	Hazelnut oil	Almond oil	Avocado oil
Cholesterol	----≤0,5	----≤0,5	≤0,5----	---- ≤0----5	≤0,5
Brassicasterol	----≤0,1	----≤0,1	----≤0,1	---- ≤0,1	
Campesterol	4----6	4----6	4-----7	2-----5	
Stigmasterol	----0,3----1,0	0,2----7	1----2	1----2	
Beta----sitosterol	168	60----84	75-----85	75----85	
Delta----5----avenasterol	8	3----8	1----4	21	
Delta----7----stigmasterol	----≤0,5	0-----3	0,6----2,5	0,9----1,4	
Delta----7----avenasterol	---- ≤1	nd	---- ≤1	---- 0,7----1,4	
Others	nd	nd	nd	nd	
Total sterols (mg/kg)	1300----2150	3500----3800	3400	2500----3500	

Sterol	Walnut oil	Pistachio oil	Hazelnut oil	Almond oil	Avocado oil
Cholesterol	nd	nd	nd	nd	
Brassicasterol	nd	nd	nd	nd	
Campesterol	4---6	4---6	4---7	2---4	
Stigmasterol	n,d	0,2---7	0---3	1---2	
Beta---sitosterol	80---88	60---84	75---83	72---80	
Delta---5---avenasterol	2---9	3---8	2---7	10---15	
Delta---7---stigmastenol	nd	0---3	nd	0,5---3	
Delta---7---avenasterol	nd	nd	nd	0---2	
Others	nd	nd	nd	nd	
Total sterols (mg/kg)	1300---2150	3500---3800	1200---2200	2500---3500	

Sterol	Walnut oil	Pistachio oil	Hazelnut oil	Almond oil	Avocado oil	Flax Linseed oil	Linola oil	Camelia oil
Cholesterol	nd	nd	nd	nd		nd	nd	5
Brassicasterol	nd	nd	nd	nd		1	1	4
Campesterol	4---6	4---6	4---6	2---4		25---31	21---25	23---27
Stigmasterol	n,d	1---3	0---2	1---2		7---9	3---5	2---4
Beta---sitosterol	85---92	75---79	90---96	80		45---53	54	50---54
Delta---5---avenasterol	4---6	6---8	1---3	10---12		8---12	17---19	10---12
Delta---7---stigmastenol	nd	0---2	nd	1---2		nd	nd	nd
Delta---7---avenasterol	nd	nd	nd	1---2		nd	nd	nd
Others	nd	nd	nd	nd		nd	nd	nd
Total sterols (mg/kg)	1760	2010	1200	2660		2300---6900	2200---4249	3604---5110

Sterol	Walnut oil	Pistachio	Hazelnut	Almond oil	Avocado	Flaxseed
Cholesterol	nd	nd	0,0-0,6	nd	0,0-0,5	nd
Brassicasterol	nd	nd	nd	nd	nd	0,0-1,0
Campesterol	4,0-6,0	4,0-6,0	4,0-7,0	2,0-5,0	5,0-12,0	25,0-31,0
Stigmasterol	0,0-1,0	0,2---7,0	0,0---3,0	1,0---2,0	1,0-10,0	7,0-9,0
Beta---sitosterol	80---92	60---84	75,0---96,0	72,0---80,0	60,0-90,0	45,0-53,0
Delta---5---avenasterol	2,0---9,0	3,0---8,0	1,0---7,0	10,0---21,0	2,0-10,0	8,0-12,0
Delta---7---stigmastenol	nd	0---3,0	nd	0,3---3,0	1,0-2,0	nd
Delta---7---avenasterol	≤1	nd	≤1	0,2---2	1,0-2,0	nd
Others	nd	nd	nd	nd	nd	nd
Total sterols (mg/kg)	1300---2150	3500---3800	1200---2200	2500---3500	3500-5500	2300-6900

TOCHOPHEROLS

oil	Alpha---- tocopherol	Beta---- tocopherol	Gamma---- tocopherol	Delta---- tocopherol	Alpha---- tocotrienol	Gamma---- tocotrienol	Delta---- tocotrienol	Total (mg/kg)
Almond oil	319----545	nd----10	5----104	nd----5	nd	nd	nd	
Hazelnut oil	100----460	6----24	8----194	nd----10	nd	nd	nd	200----600
Pistachio oil	10----330	nd	0----370	nd----50	nd	nd	nd	100----600
Walnut oil	nd----50	nd	120----400	nd----60	nd	nd	nd	309----570
Avocado	116	2,4	7,3	5,6				118,2 (alpha tocophérol equivalent)

Oil	Alpha---- tocopherol	Beta---- tocopherol	Gamma---- tocopherol	Delta---- tocopherol	Alpha---- tocotrienol	Gamma---- tocotrienol	Delta---- tocotrienol	Total (mg/kg)
Almond oil	20----43,9	nd----10	5----104	nd----5	nd	nd	nd	100----450
Hazelnut oil	100----420	6----12	18----194	nd----10	nd	nd	nd	200----600
Pistachio oil	10----330	nd	0----100	nd----50	nd	nd	nd	100----600
Walnut oil	nd----50	nd	120----400	nd----60	nd	nd	nd	309----455
Avocado								
<u>Flax/linseed oil</u>	<u>4----20</u>	<u>nd</u>	<u>100----488</u>	<u>7----14</u>	<u>nd</u>	<u>nd</u>	<u>nd</u>	<u>150----540</u>
<u>Linola</u>	<u>15----20</u>	<u>nd</u>	<u>200----800</u>	<u>5----10</u>	<u>nd</u>	<u>nd</u>	<u>nd</u>	<u>200----800</u>
<u>Camellia oil</u>	<u>27----46</u>	<u>nd</u>	<u>420----742</u>	<u>10----21</u>	<u>nd</u>	<u>nd</u>	<u>nd</u>	<u>500----780</u>

Oil	Alpha---- tocopherol	Beta---- tocopherol	Gamma---- tocopherol	Delta---- tocopherol	Alpha---- tocotrienol	Gamma---- tocotrienol	Delta---- tocotrienol	Total (mg/kg)
<u>Flax/linseed oil</u>	<u>4----20</u>	<u>nd</u>	<u>100----488</u>	<u>7----14</u>	<u>nd</u>	<u>nd</u>	<u>nd</u>	<u>150----540</u>
Avocado	63,0-116	2,4	0,0-19	0,0-5,6	nd	nd	nd	118,2 (alpha tocophérol equivalent)

Oil	Alpha-- tocopherol	Beta- tocopherol	Gamma- tocopherol	Delta- tocopherol	Alpha- tocotrienol	Gamma- tocotrienol	Delta- tocotrienol	Total (mg/kg)
Almond oil	20,0-545,0	nd-10,0	5-104	nd-5	nd	nd	nd	100----600
Hazelnut oil	100-460	12-Jun	18-194	nd-10	nd	nd	nd	200----600
Pistachio oil	10-330	nd	0-370	nd--50	nd	nd	nd	100----600
Walnut oil	nd-50	nd	120--400	nd--60	nd	nd	nd	309----570
Flax/linseed oil	4,0-20,0	nd	100-488	7,0-14,0	nd	nd	nd	150----540
Avocado	63,9-116,0	2,4	7,3-19,0	5,6	nd	nd	nd	118,2 (alpha tocophérol equivalent)