



Food and Agriculture
Organization of the
United Nations



World Health
Organization

CODEX
ALIMENTARIUS
INTERNATIONAL FOOD STANDARDS

CODEX ALIMENTARIUS
STANDARD

**STANDARD FOR
NAMED VEGETABLE OILS**
CXS 210-1999



ADOPTED 1999
AMENDED 2026

CXS 210-1999

History of the standard

2026 Corrigenda

In July 2026, a transcription error in Table 1 was corrected where the fatty acid composition values for Mustardseed oil were transcribed into the rows for Palm oil and Palm oil with a higher oleic acid when the standard was redesigned and published earlier in the year.

In March 2026, a footnote that read: "The fatty acid values in this table apply to the vegetable oils described in Section 2.1: "Product definitions" presented in a state for human consumption. However, in order to provide clarity in trade of crude oils, the values of the table may also be applied for the corresponding crude forms of the vegetable oils described in Section 2.1: "Product definitions" was removed from Table A3 and Table A4. This footnote had been incorrectly added to these tables following the decision to adopt the addition of the footnote to Table 1 by CAC42 (citing REP19/FO paragraph 137 and Appendix II, Part A2).

2026 Amendments

Following decisions taken at the Forty-ninth Session of the Codex Alimentarius Commission in 2026, Section 8: "Methods of analysis and sampling" and Appendix, Section 5: "Methods of analysis and sampling" were amended by replacing the methods of analysis with a reference to the *Recommended methods of analysis and sampling* (CXS 234-1999).

This publication was reformatted and published in 2026.

2024 Amendments

Following decisions taken at the Forty-seventh Session of the Codex Alimentarius Commission in December 2024, avocado oil, camellia seed oil, Sacha inchi-oil and soya bean oil – high-oleic acid were added in Section 2: "Description", Section 3: "Essential composition and quality factors", Table 1, tables A2 to A4 and amendments were made in Section 7.2: "Labelling of non-retail containers".

2023 Amendments

Following decisions taken at the Forty-sixth Session of the Codex Alimentarius Commission in December 2023, amendments were made in Section 4: "Food additives", Section 8: "Methods of analysis and sampling" and in the Appendix, Section 5: "Methods of analysis and sampling".

2022 Amendments

Following decisions taken at the Forty-fifth Session of the Codex Alimentarius Commission in December 2022, amendments were made in Table 1 and Table 2 with regard to the values of the provisions for fatty acid C18:1 and C18:2, relative density, refractive density and saponification in sunflower seed oil.

Amendments and revisions made prior to 2022:

Amended in 2005, 2011, 2013, 2015, 2019 and 2021.

Revised in 2001, 2003, 2009, 2017 and 2019.

Adopted in 1999.

1 Scope

This standard applies to the vegetable oils described in Section 2.1: “Product definitions”, presented in a state for human consumption.

2 Description

2.1 Product definitions

(Note: synonyms are in brackets immediately following the name of the oil)

Almond oil is derived from the kernel of almond fruit (*Amygdalus communis* L.).

Avocado oil may be derived from either the mesocarp of avocado fruit (*Persea americana*) or obtained by processing the whole avocado fruit.

Arachis oil (peanut oil; groundnut oil) is derived from groundnuts (seeds of *Arachis hypogaea* L.).

Babassu oil is derived from the kernel of the fruit of several varieties of the palm *Orbignya* spp.

Camellia seed oil (youcha oil) is derived from the seeds of cultivated *Camellia* species (*C. oleifera*, *C. chekiangoleosa*, *C. japonica* and *C. vietnamensis*).

Coconut oil is derived from the kernel of the coconut (*Cocos nucifera* L.).

Cottonseed oil is derived from the seeds of various cultivated species of *Gossypium* spp.

Flaxseed (Linseed) oil is derived from the seeds of various cultivated species of *Linum usitatissimum*

Grapeseed oil is derived from the seeds of the grape (*Vitis vinifera* L.).

Hazelnut oil is derived from the kernel of hazelnut fruit (*Corylus avellana* L.).

Maize oil (corn oil) is derived from maize germ (the embryos of *Zea mays* L.).

Mustard seed oil is derived from the seeds of white mustard (*Sinapis alba* L. or *Brassica hirta* Moench), brown and yellow mustard (*Brassica juncea* (L.) Czernajew and Cossen) and of black mustard (*Brassica nigra* (L.) Koch).

Palm kernel oil is derived from the kernel of the fruit of the oil palm (*Elaeis guineensis*).

Palm kernel olein is the liquid fraction derived from fractionation of palm kernel oil (described above).

Palm kernel stearin is the solid fraction derived from fractionation of palm kernel oil (described above).

Palm oil is derived from the fleshy mesocarp of the fruit of the oil palm (*Elaeis guineensis*).

Palm oil with a higher content of oleic acid is derived from the fleshy mesocarp of hybrid palm fruit (OxG) (*Elaeis oleifera* x *Elaeis guineensis*)

Palm olein is the liquid fraction derived from the fractionation of palm oil (described above).

Palm stearin is the high-melting fraction derived from the fractionation of palm oil (described above).

Palm superolein is a liquid fraction derived from palm oil (described above) produced through a specially controlled crystallization process to achieve an iodine value of 60 or higher.

Pistachio oil is derived from the kernel of pistachio fruit (*Pistacia vera* L.).

Rapeseed oil (turnip rape oil; colza oil; ravison oil; sarson oil; toria oil) is produced from seeds of *Brassica napus* L., *Brassica rapa* L., *Brassica juncea* L. and *Brassica tournefortii* Gouan species.

Rapeseed oil – low-erucic acid (low-erucic acid turnip rape oil; low-erucic acid colza oil; canola oil) is produced from low-erucic acid oil-bearing seeds of varieties derived from the *Brassica napus* L., *Brassica rapa* L. and *Brassica juncea* L., species.

Rice bran oil (rice oil) is derived from the bran of rice (*Oryza sativa* L.).

Sacha inchi oil is derived from the seeds of sacha inchi (*Plukenetia volubilis* L.).

Safflower seed oil (safflower oil; carthamus oil; kurdee oil) is derived from safflower seeds (seeds of *Carthamus tinctorius* L.).

Safflower seed oil – high-oleic acid (high-oleic acid safflower oil; high-oleic acid carthamus oil; high-oleic acid kurdee oil) is produced from high-oleic acid oil-bearing seeds of varieties derived from *Carthamus tinctorius* L.

Sesame seed oil (sesame oil; gingelly oil; benne oil; ben oil; till oil; tillie oil) is derived from sesame seeds (seeds of *Sesamum indicum* L.).

Soya bean oil (soybean oil) is derived from soya beans (seeds of *Glycine max* (L.) Merr.).

Soya bean oil – high-oleic acid (soybean oil – high-oleic acid; high-oleic acid soya bean oil; high-oleic acid soybean oil) is produced from high-oleic acid oil-bearing seeds of varieties derived from soya beans (seeds of *Glycine max* (L.) Merr.).

Sunflower seed oil (sunflower oil) is derived from sunflower seeds (seeds of *Helianthus annuus* L.).

Sunflower seed oil – high-oleic acid (high-oleic acid sunflower oil) is produced from high-oleic acid oilbearing seeds of varieties derived from sunflower seeds (seeds of *Helianthus annuus* L.).

Sunflower seed oil – mid-oleic acid (mid-oleic acid sunflower oil) is produced from mid-oleic acid oilbearing sunflower seeds (seeds of *Helianthus annuus* L.).

Walnut oil is derived from the kernel of walnut fruit (*Juglans regia* L.).

2.2 Other definitions

Edible vegetable oils are foodstuffs which are composed primarily of glycerides of fatty acids obtained only from vegetable sources. They may contain small amounts of other lipids such as phosphatides, of unsaponifiable constituents, and of free fatty acids naturally present in the fat or oil.

Virgin oils are obtained, without altering the nature of the oil, by mechanical procedures, e.g. expelling or pressing, and the application of heat only. They may have been purified by washing with water, settling, filtering and centrifuging only.

Cold-pressed oils are obtained, without altering the oil, by mechanical procedures only e.g. expelling or pressing, without the application of heat. They may have been purified by washing with water, settling, filtering and centrifuging only.

3 Essential composition and quality factors

3.1 Gas-liquid chromatography (GLC) ranges of fatty acid composition (expressed as percentages)

Samples falling within the appropriate ranges specified in Table 1 are in compliance with this standard. Supplementary criteria, for example national geographical and/or climatic variations, may be considered, as necessary, to confirm that a sample complies with the standard.

Low-erucic acid rapeseed oil must not contain more than 2 percent erucic acid (as percentage of total fatty acids).

High-oleic acid safflower oil must contain not less than 70 percent oleic acid (as percentage of total fatty acids).

High-oleic acid soya bean oil must contain not less than 65 percent oleic acid (as a percentage of total fatty acids).

High-oleic acid sunflower oil must contain not less than 75 percent oleic acid (as percentage of total fatty acids).

Palm oil with a higher content of oleic acid must contain not less than 48 percent oleic acid (as percentage of total fatty acids).

3.2 Slip point

Palm kernel olein	between 21 °C and 26 °C
Palm kernel stearin	between 31 °C and 34 °C
Palm olein	not more than 24 °C
Palm stearin	not less than 44 °C
Palm superolein	not more than 19.5 °C

4 Food additives

Antifoaming agents, antioxidants and emulsifiers used in accordance with Table 1 and Table 2 of the *General standard for food additives* (CXS 192-1995)¹ in food category 02.1.2 (Vegetable oils and fats) are acceptable for use in foods conforming to this standard.

No food additives are permitted in virgin or cold-pressed oils.

The flavourings used in products covered by this standard should comply with the *Guidelines for the use of flavourings* (CXG 66-2008).²

5 Contaminants

The products covered by this standard shall comply with the maximum levels of the *General standard for contaminants and toxins in food and feed* (CXS 193-1995).³

The products covered by this standard shall comply with the maximum residue limits for pesticides established by the Codex Alimentarius Commission.

6 Hygiene

It is recommended that the products covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the *General principles of food hygiene* (CXC 1-1969)⁴ and other relevant Codex Alimentarius texts such as codes of hygienic practice and codes of practice.

The products should comply with any microbiological criteria established in accordance with the *Principles and guidelines for the establishment and application of microbiological criteria related to foods* (CXG 21-1997).⁵

7 Labelling

7.1 Name of the food

The product shall be labelled in accordance with the *General standard for the labelling of pre-packaged foods* (CXS 1-1985).⁶ The name of the oil shall conform to the descriptions given in Section 2: “Description” of this standard.

Where more than one name is given for a product in Section 2.1: “Product definitions”, the labelling of that product must include one of those names acceptable in the country of use.

7.2 Labelling of non-retail containers

The labelling of non-retail containers should be in accordance with the *General standard for the labelling of non-retail containers of foods* (CXS 346-2021).⁷

8 Methods of analysis and sampling

For checking compliance with this standard, the methods of analysis and sampling contained in the *Recommended methods of analysis and sampling* (CXS 234-1999)⁸ relevant to the provisions in this standard shall be used.

Table 1: Fatty acid composition of vegetable oils as determined by gas-liquid chromatography from authentic samples^{1,2}
(expressed as percentage of total fatty acids) (see Section 3.1: “Gas-liquid chromatography (GLC) ranges of fatty acid composition” of the standard)

Fatty acid	C6:0	C8:0	C10:0	C12:0	C14:0	C16:0	C16:1	C17:0	C17:1	C18:0	C18:1	C18:2	C18:3	C20:0	C20:1	C20:2	C22:0	C22:1	C22:2	C24:0	C24:1
Arachis oil	ND	ND	ND	ND-0.1	ND-0.1	5.0-14.0	ND-0.2	ND-0.1	ND-0.1	1.0-4.5	35.0-80	4.0-43.0	ND-0.5	0.7-2.0	0.7-3.2	ND	1.5-4.5	ND-0.6	ND	0.5-2.5	ND-0.3
Almond oil	ND	ND	ND	ND	ND-0.1	4.0-9.0	0.2-0.8	ND-0.2	ND-0.2	ND-3.0	62.0-76.0	20.0-30.0	ND-0.5	ND-0.5	ND-0.3	ND	ND-0.2	ND-0.1	ND	ND-0.2	ND
Avocado oil	ND	ND	ND	ND	ND-0.3	11.0-26.0	4.0-17.1	ND-0.3	ND-0.1	0.1-1.3	42.0-75.0	7.8-19.0	0.5-2.1	ND-0.7	ND-0.3	ND	ND-0.5	ND	ND	ND-0.2	ND-0.2
Babassu oil	ND	2.6-7.3	1.2-7.6	40.0-55.0	11.0-27.0	5.2-11.0	ND	ND	ND	1.8-7.4	9.0-20.0	1.4-6.6	ND	ND	ND	ND	ND	ND	ND	ND	ND
Camellia seed oil	ND	ND	ND	ND	ND-0.8	3.9-14.5	ND-0.2	ND-0.1	ND-0.1	0.3-4.8	68.0-87.0	3.8-14.0	ND-1.4	ND-0.5	ND-0.7	ND	ND-0.1	ND-0.5	ND	ND	ND-0.5
Coconut oil	ND-0.7	4.6-10.0	5.0-8.0	45.1-53.2	16.8-21.0	7.5-10.2	ND	ND	ND	2.0-4.0	5.0-10.0	1.0-2.5	ND-0.2	ND-0.2	ND-0.2	ND	ND	ND	ND	ND	ND
Cotton seed oil	ND	ND	ND	ND-0.2	0.6-1.0	21.4-26.4	ND-1.2	ND-0.1	ND-0.1	2.1-3.3	14.7-21.7	46.7-58.2	ND-0.4	0.2-0.5	ND-0.1	ND-0.1	ND-0.6	ND-0.3	ND-0.1	ND-0.1	ND
Flaxseed/linseed oil	ND	ND	ND	ND-0.3	ND-0.2	4.0-11.3	ND-0.5	ND-0.1	ND-0.1	2.0-8.0	9.8-36.0	8.3-30.0	43.8-70.0	ND-1.0	ND-1.2	ND	ND-0.5	ND-1.2	ND	ND-0.3	ND
Grape seed oil	ND	ND	ND	ND	ND-0.3	5.5-11.0	ND-1.2	ND-0.2	ND-0.1	3.0-6.5	12.0-28.0	58.0-78.0	ND-1.0	ND-1.0	ND-0.3	ND	ND-0.5	ND-0.3	ND	ND-0.4	ND
Hazelnut oil	ND	ND	ND	ND	ND-0.1	4.2-8.9	ND-0.5	ND-0.1	ND-0.1	0.8-3.2	74.2-86.7	5.2-18.7	ND-0.6	ND-0.3	ND-0.3	ND	ND-0.2	ND-0.1	ND	ND	ND-0.3
Maize oil	ND	ND	ND	ND-0.3	ND-0.3	8.6-16.5	ND-0.5	ND-0.1	ND-0.1	ND-3.3	20.0-42.2	34.0-65.6	ND-2.0	0.3-1.0	0.2-0.6	ND-0.1	ND-0.5	ND-0.3	ND	ND-0.5	ND
Mustardseed oil	ND	ND	ND	ND	ND-1.0	0.5-4.5	ND-0.5	ND	ND	0.5-2.0	8.0-23.0	10.0-24.0	6.0-18.0	ND-1.5	5.0-13.0	ND-1.0	0.2-2.5	22.0-50.0	ND-1.0	ND-0.5	0.5-2.5
Palm oil	ND	ND	ND	ND-0.5	0.5-2.0	39.3-47.5	ND-0.6	ND-0.2	ND	3.5-6.0	36.0-44.0	9.0-12.0	ND-0.5	ND-1.0	ND-0.4	ND	ND-0.2	ND	ND	ND	ND

Fatty acid	C6:0	C8:0	C10:0	C12:0	C14:0	C16:0	C16:1	C17:0	C17:1	C18:0	C18:1	C18:2	C18:3	C20:0	C20:1	C20:2	C22:0	C22:1	C22:2	C24:0	C24:1
Palm oil with a higher oleic acid	ND	ND	ND	ND-0.6	ND-0.8	23.0-38.0	ND-0.8	ND-0.2	ND	1.5-4.5	48.0-60.0	9.0-17.0	ND-0.6	ND-0.4	ND-0.2	ND-0.5	ND-0.3	ND	ND	ND-0.2	ND
Palm kernel oil	ND-0.8	2.4-6.2	2.6-5.0	45.0-55.0	14.0-18.0	6.5-10.0	ND-0.2	ND	ND	1.0-3.0	12.0-19.0	1.0-3.5	ND-0.2	ND-0.2	ND-0.2	ND	ND-0.2	ND	ND	ND	ND
Palm olein***	ND	ND	ND	0.1-0.5	0.5-1.5	38.0-43.5	ND-0.6	ND-0.2	ND-0.1	3.5-5.0	39.8-46.0	10.0-13.5	ND-0.6	ND-0.6	ND-0.4	ND	ND-0.2	ND	ND	ND	ND
Palm kernel olein***	ND-0.7	2.9-6.3	2.7-4.5	39.7-47.0	11.5-15.5	6.2-10.6	ND-0.1	ND	ND	1.7-3.0	14.4-24.6	2.4-4.3	ND-0.3	ND-0.5	ND-0.2	ND	ND	ND	ND	ND	ND
Palm kernel stearin***	ND-0.2	1.3-3.0	2.4-3.3	52.0-59.7	20.0-25.0	6.7-10.0	ND	ND	ND	1.0-3.0	4.1-8.0	0.5-1.5	ND-0.1	ND-0.5	ND-0.1	ND	ND	ND	ND	ND	ND
Palm stearin***	ND	ND	ND	0.1-0.5	1.0-2.0	48.0-74.0	ND-0.2	ND-0.2	ND-0.1	3.9-6.0	15.5-36.0	3.0-10.0	ND-0.5	ND-1.0	ND-0.4	ND	ND-0.2	ND	ND	ND	ND
Palm superolein***	ND	ND	ND	0.1-0.5	0.5-1.5	30.0-39.0	ND-0.5	ND-0.1	ND	2.8-4.5	43.0-49.5	10.5-15.0	0.2-1.0	ND-0.4	ND-0.2	ND	ND-0.2	ND	ND	ND	ND
Pistachio oil	ND	ND	ND	ND	ND-0.6	8.0-13.0	ND-0.2	ND-0.1	ND-0.1	0.5-3.5	50.0-70.0	8.0-34.0	0.1-1.0	ND-0.3	ND-0.6	ND	ND	ND	ND	ND	ND
Rapeseed oil	ND	ND	ND	ND	ND-0.2	1.5-6.0	ND-3.0	ND-0.1	ND-0.1	0.5-3.1	8.0-60.0	11.0-23.0	5.0-13.0	ND-3.0	3.0-15.0	ND-1.0	ND-2.0	>2.0-60.0	ND-2.0	ND-2.0	ND-3.0
Rapeseed oil (low-erucic acid)	ND	ND	ND	ND	ND-0.2	2.5-7.0	ND-0.6	ND-0.3	ND-0.3	0.8-3.0	51.0-70.0	15.0-30.0	5.0-14.0	0.2-1.2	0.1-4.3	ND-0.1	ND-0.6	ND-2.0	ND-0.1	ND-0.3	ND-0.4
Rice bran oil	ND	ND	ND	ND-0.2	ND-1.0	14-23	ND-0.5	ND	ND	0.9-4.0	38-48	21-42	0.1-2.9	ND-0.9	ND-0.8	ND	ND-1.0	ND	ND	ND-0.9	ND
Sacha inchi oil	ND	ND	ND	ND	ND	3.6-4.8	ND-0.1	ND-0.1	ND	2.6-4.0	6.0-11.7	32.0-43.4	36.2-50.0	ND-0.1	ND-0.4	ND-0.1	ND-0.1	ND-0.1	ND	ND	ND
Safflower seed oil	ND	ND	ND	ND	ND-0.2	5.3-8.0	ND-0.2	ND-0.1	ND-0.1	1.9-2.9	8.4-21.3	67.8-83.2	ND-0.1	0.2-0.4	0.1-0.3	ND	ND-1.0	ND-1.8	ND	ND-0.2	ND-0.2

Fatty acid	C6:0	C8:0	C10:0	C12:0	C14:0	C16:0	C16:1	C17:0	C17:1	C18:0	C18:1	C18:2	C18:3	C20:0	C20:1	C20:2	C22:0	C22:1	C22:2	C24:0	C24:1
Safflower seed oil (high-oleic acid)	ND	ND	ND	ND-0.2	ND-0.2	3.6-6.0	ND-0.2	ND-0.1	ND-0.1	1.5-2.4	70.0-83.7	9.0-19.9	ND-1.2	0.3-0.6	0.1-0.5	ND	ND-0.4	ND-0.3	ND	ND-0.3	ND-0.3
Sesame seed oil	ND	ND	ND	ND	ND-0.1	7.9-12.0	ND-0.2	ND-0.2	ND-0.1	4.5-6.7	34.4-45.5	36.9-47.9	0.2-1.0	0.3-0.7	ND-0.3	ND	NN-1.1	ND	ND	ND-0.3	ND
Soyabean oil	ND	ND	ND	ND-0.1	ND-0.2	8.0-13.5	ND-0.2	ND-0.1	ND-0.1	2.0-5.4	17-30	48.0-59.0	4.5-11.0	0.1-0.6	ND-0.5	ND-0.1	ND-0.7	ND-0.3	ND	ND-0.5	ND
Soya bean oil (high-oleic acid)	ND	ND-0.1	ND-0.1	ND-0.1	ND-0.5	2.5-8.0	ND-0.1	ND-0.8	ND-1.5	3.2-5.0	65.0-87.0	1.0-16.0	1.0-6.0	ND-1.0	ND-1.0	ND-0.1	ND-0.7	ND-0.4	ND	ND-0.5	ND
Sunflower seed oil	ND	ND	ND	ND-0.1	ND-0.2	5.0-7.6	ND-0.3	ND-0.2	ND-0.1	2.7-6.5	14.0-43.0	45.4-74.0	ND-0.3	0.1-0.5	ND-0.3	ND	0.3-1.5	ND-0.3	ND-0.3	ND-0.5	ND
Sunflower seed oil (high oleic acid)	ND	ND	ND	ND	ND-0.1	2.6-5.0	ND-0.1	ND-0.1	ND-0.1	2.9-6.2	75-90.7	2.1-17	ND-0.3	0.2-0.5	0.1-0.5	ND	0.5-1.6	ND-0.3	ND	ND-0.5	ND
Sunflower seed oil (mid-oleic acid)	ND	ND	ND	ND	ND-1	4.0-5.5	ND-0.05	ND-0.05	ND-0.06	2.1-5.0	43.1-71.8	18.7-45.3	ND-0.5	0.2-0.4	0.2-0.3	ND	0.6-1.1	ND	ND-0.09	0.3-0.4	ND
Walnut oil	ND	ND	ND	ND	ND	6.0-8.0	ND-0.4	ND-0.1	ND-0.1	1.0-3.0	14.0-23.0	54.0-65.0	9.0-15.4	ND-0.3	ND-0.3	ND	ND-0.2	ND	ND	ND	ND

Notes:
* Data taken from species as listed in Section 2: "Description".
** The fatty acid values in this table apply to the vegetable oils described in Section 2.1: "Product definitions" presented in a state for human consumption. However, in order to provide clarity in trade of crude oils, the values of the table may also be applied for the corresponding crude forms of the vegetable oils described in Section 2.1: "Product definitions".
*** Fractionated product from palm oil.
ND - non detectable, defined as ≤ 0.05%.

APPENDIX

Other quality and composition factors

These quality and composition factors are supplementary information to the essential composition and quality factors of the standard. A product which meets the essential quality and composition factors but does not meet these supplementary factors may still conform to the standard.

1. Quality characteristics

The **colour, odour and taste** of each product shall be characteristic of the designated product. It shall be free from foreign and rancid odour and taste.

Table A1

	Maximum level
Matter volatile at 105 °C	0.2% m/m
Insoluble impurities	0.05% m/m
Soap content	0.005% m/m
Iron (Fe):	
Refined oils	1.5 mg/kg
Virgin oils	5.0 mg/kg
Crude palm kernel olein	5.0 mg/kg
Crude palm kernel stearin	7.0 mg/kg
Copper (Cu)	
Refined oils	0.1 mg/kg
Virgin oils	0.4 mg/kg
Acid value	
Refined oils	0.6 mg KOH/g oil
Cold-pressed and virgin oils (except crude palm kernel oil and virgin palm oil)	4.0 mg KOH/g oil
Free fatty acid	
Virgin palm oil	5.0% (as palmitic acid)
Crude palm kernel oil	4.0% (as lauric acid)
Refined rice bran oil	0.3% (as oleic acid)
Peroxide value	
Refined oils	up to 10 milliequivalents of active oxygen/kg oil
Cold-pressed and virgin oils	up to 15 milliequivalents of active oxygen/kg oil

2. Composition characteristics

The **arachidic and higher fatty acid content** of arachis oil should not exceed 48 g/kg.

The **Reichert values** for coconut, palm kernel and babassu oils should be in the ranges 6–8.5, 4–7 and 4.5–6.5, respectively.

The **Polenske values** for coconut, palm kernel and babassu oils should be in the ranges 13–18, 8–12 and 8–10, respectively.

The **Halphen test** for cotton seed oil should be positive.

The **erythrodiol content** of grapeseed oil should be more than 2 percent of the total sterols.

The **total carotenoids** (as beta-carotene) for unbleached palm oil, unbleached palm olein and unbleached palm stearin should be in the range of 500–2 000, 550–2 500 and 300–1 500 mg/kg, respectively.

The **Crismer value** for low-erucic acid rapeseed oil should be in the range 67–70.

The **concentration of brassicasterol** in low-erucic acid rapeseed oil should be greater than 5 percent of total sterols.

The **Baudouin test** should be positive for sesame seed oil.

The **gamma oryzanols** in crude rice bran oil should be in the range of 0.9–2.1 percent.

3. Chemical and physical characteristics

Chemical and physical characteristics are given in Table A2.

4. Identity characteristics

Levels of desmethylsterols in vegetable oils as a percentage of total sterols are given in Table A3.

Levels of tocopherols and tocotrienols in vegetable oils are given in Table A4.

5. Methods of analysis and sampling

For checking compliance with this standard, the methods of analysis and sampling contained in the *Recommended methods of analysis and sampling* (CXS 234-1999)⁸ relevant to the provisions in this standard shall be used.

Table A2: Chemical and physical characteristics of crude vegetable oils (see appendix)

	Relative density (x °C/ water at 20 °C)	Apparent density (g/ml)	Refractive index (ND 40 °C)	Saponification value (mg KOH/g oil)	Iodine value	Unsaponifiable matter (g/kg)	Stable carbon isotope ratio*
Arachis oil	0.909-0.920 x=20 °C		1.460-1.465	187-196	77-107	≤ 10	
Almond oil	0.911-0.929 x=25 °C		1.468-1.475 at 20 °C	183-207	85-109	≤ 20	
Avocado oil	0.910-0.920 x=20 °C		1.458-1.470	170-202	78-95	≤ 19.0	
Babassu oil	0.914-0.917 x=25 °C		1.448-1.451	245-256	10-18	≤ 12	
Camellia seed oil	0.912-0.922 x=20 °C		1.460-1.464	187-199	83-89	≤ 15	
Coconut oil	0.908-0.921 x=40 °C		1.448-1.450	248-265	6.3-10.6	≤ 15	
Cotton seed oil	0.918-0.926 x=20 °C		1.458-1.466	189-198	100-123	≤ 15	
Flaxseed/linseed oil	0.925-0.935 x=25 °C / water 25 °C		1.472-1.487 at 20 °C; 1.472-1.475 at 40 °C	185-197	170-211	≤ 20	
Grape seed oil	0.920-0.926 x=20 °C		1.467-1.477	188-194	128-150	≤ 20	
Hazelnut oil	0.898-0.915 x=20 °C		1.468-1.473 at 20 °C; 1.456-1.463 at 40 °C	188-198	81-95	≤ 15	
Maize oil	0.917-0.925 x=20 °C		1.465-1.468	187-195	103-135	≤ 28	-13.71 to -16.36
Mustard seed oil	0.910-0.921 x=20 °C		1.461-1.469	168-184	92-125	≤ 15	
Palm oil	0.891-0.899 x=50 °C	0.889-0.895 (50 °C)	1.454-1.456 at 50 °C	190-209	50.0-55.0	≤ 12	
Palm oil with a higher oleic acid	0.896-0.910 x=50 °C	ND	1.459-1.462	189-199	58-75	≤ 12	
Palm kernel oil	0.899-0.914 x=40 °C		1.448-1.452	230-254	14.1-21.0	≤ 10	
Palm kernel olein**	0.906-0.909 x=40 °C	0.904-0.907	1.451-1.453	231-244	20-28	< 15	
Palm kernel stearin**	0.902-0.908 x=40 °C	0.904-0.906	1.449-1.451	244-255	4-8.5	< 15	

	Relative density (x °C/ water at 20 °C)	Apparent density (g/ml)	Refractive index (ND 40 °C)	Saponification value (mg KOH/g oil)	Iodine value	Unaponifiable matter (g/kg)	Stable carbon isotope ratio*
Palm olein**	0.899-0.920 x=40°C	0.896-0.898 at 40 °C	1.458-1.460	194-202	≥ 56	≤ 13	
Palm stearin**	0.881-0.891 x=60°C	0.881-0.885 at 60 °C	1.447-1.452 at 60 °C	193-205	≤ 48	≤ 9	
Palm super olein**	0.900-0.925 x=40°C	0.886-0.900 at 40 °C	1.459-1.460	180-205	≥ 60	≤ 13	
Pistachio oil	0.915-0.920 15.5 °C/ water 15.5 °C		1.467-1.470 at 25 °C; 1.460-1.466 at 40 °C	187-196	84-98	≤ 30	
Rapeseed oil	0.910-0.920 x=20 °C		1.465-1.469	168-181	94-120	≤ 20	
Rapeseed oil (low-erucic acid)	0.914-0.920 x=20 °C		1.465-1.467	182-193	105-126	≤ 20	
Rice bran oil	0.910-0.929		1.46- 1.473	180-199	90-115	≤ 65	
Sacha inchi oil	0.920-0.930 x=20 °C		1.478- 1.482	185-196	182-205	≤ 5	
Safflower seed oil	0.922-0.927 x=20 °C		1.467-1.470	186-198	136-148	≤ 15	
Safflower seed oil (high- oleic acid)	0.913-0.919 x=20 °C; 0.910-0.916 x=25 °C	0.912-0.914 at 20 °C	1.460-1.464 at 40 °C; 1.466-1.470 at 25 °C	186-194	80-100	≤ 10	
Sesame seed oil	0.915-0.924 x=20 °C		1.465-1.469	186-195	104-120	≤ 20	
Soyabean oil	0.919-0.925 x=20 °C		1.466-1.470	189-195	124-139	≤ 15	
Soya bean oil (high-oleic acid)	0.909-0.923 x=20 °C		1.462-1.468	188-192	75-95	≤ 15	
Sunflower seed oil	0.916-0.923 x=20 °C		1.461-1.475	187-194	118-141	≤ 15	
Sunflower seed oil (high- oleic acid)	0.909-0.915 x=25 °C		1.467-1.471 at 25 °C	182-194	78-90	≤ 15	
Sunflower seed oil (mid- oleic acid)	0.914-0.916 x=20 °C		1.461- 1.471 at 25 °C	190-191	94-122	≤ 15	

	Relative density (x °C/ water at 20 °C)	Apparent density (g/ml)	Refractive index (ND 40 °C)	Saponification value (mg KOH/g oil)	Iodine value	Unsaponifiable matter (g/kg)	Stable carbon isotope ratio*
Walnut oil	0.923–0.925 25 °C/ water 25 °C		1.472–1.475 at 25 °C; 1.469–1.471 at 40 °C	189–198	132–162	≤ 20	

Notes:

*Sources:

Woodbury SP, Evershed RP and Rossell JB (1998). Purity assessments of major vegetable oils based on gamma 13C values of individual fatty acids. *JAQCS*, 75 (3), 371–379.

Woodbury SP, Evershed RP and Rossell JB (1998). Gamma 13C analysis of vegetable oil, fatty acid components, determined by gas chromatography-combustion-isotope ratio mass spectrometry, after saponification or regiospecific hydrolysis. *Journal of Chromatography A*, 805, 249–257.

Woodbury SP, Evershed RP, Rossell JB, Griffith R and Farnell P (1995). Detection of vegetable oil adulteration using gas chromatography combustion/isotope ratio mass spectrometry. *Analytical Chemistry*, 67 (15), 2685–2690.

Ministry of Agriculture, Fisheries and Food (1996). Authenticity of single seed vegetable oils. Working Party on Food Authenticity, MAFF, UK.

“ Fractionated product from palm oil.

Table A3: Levels of desmethylsterols in crude vegetable oils from authentic samples' as a percentage of total sterols (see appendix of the standard)

	Cholesterol	Brassicasterol	Campesterol	Stigmasterol	Beta-sitosterol	Delta-5-avenasterol	Delta-7-stigmastenol	Delta-7-avenasterol	Others	Total sterols (mg/kg)
Arachis oil	ND-3.8	ND-0.2	12.0-19.8	5.4-13.2	47.4-69.0	5.0-18.8	ND-5.1	ND-5.5	ND-1.4	900-2 900
Almond oil	ND-1.0	ND-0.3	2.0-5.0	0.4-4.0	73.0-86.0	5.0-14.0	ND-3.0	ND-3.0	ND-6.0	1 590- 4 590
Avocado oil**	ND-0.5	ND-0.5	4.0-8.3	0.3-2.0	79.0-93.4	2.0-8.0	ND-1.5	ND-1.5	ND-2.0	3 000-7 500
Babassu oil	1.2-1.7	ND-0.3	17.7-18.7	8.7-9.2	48.2-53.9	16.9-20.4	ND	0.4-1.0	ND	500-800
Camellia seed oil	ND	ND	0.5-2.1	0.3-4.6	16.0-60.0	0.4-4.3	37.2-69.0	0.9-8.5	0.5-5.1	100-4 000
Coconut oil	ND-3.0	ND-0.3	6.0-11.2	11.4-15.6	32.6-50.7	20.0-40.7	ND-3.0	ND-3.0	ND-3.6	400-1 200
Cottonseed oil	0.7-2.3	0.1-0.3	6.4-14.5	2.1-6.8	76.0-87.1	1.8-7.3	ND-1.4	0.8-3.3	ND-1.5	2 700-6 400
Flaxseed/ linseed oil	ND	ND-1.0	25.0- 31.0	7.0-9.0	45.0-53.0	8.0-12.0	ND	ND	ND	2 300 - 6 900
Grapeseed oil	ND-0.5	ND-0.2	7.5-14.0	7.5-12.0	64.0-70.0	1.0-3.5	0.5-3.5	0.5-1.5	ND-5.1	2 000-7 000
Hazelnut oil	ND-1.1	ND	3.0-6.2	ND-2.0	76.45-96.0	1.0-5.1	ND-4.3	ND-1.6	ND	1 200 - 1 800
Maize oil	0.2-0.6	ND-0.2	16.0-24.1	4.3-8.0	54.8-66.6	1.5-8.2	0.2-4.2	0.3-2.7	ND-2.4	7 000-22 100
Palm oil	2.6-6.7	ND	18.7-27.5	8.5-13.9	50.2-62.1	ND-2.8	0.2-2.4	ND-5.1	ND	300-700
Palm oil with a higher oleic acid	1.7-4.7	ND-0.4	16.6-21.9	11.2-15.5	57.2-67.0	ND-1.9	ND-0.2	ND-1.0	ND-3.8	519-1723
Palm olein***	2.6-7.0	ND	12.5-39.0	7.0-18.9	45.0-71.0	ND-3.0	ND-3.0	ND-6.0	ND-10.4	270-800
Palm kernel oil	0.6-3.7	ND-0.8	8.4-12.7	12.0-16.6	62.6-73.1	1.4-9.0	ND-2.1	ND-1.4	ND-2.7	700-1 400
Palm kernel olein***	1.5-1.9	ND-0.2	7.9-9.1	13.4-14.7	67.1-69.2	3.3-4.6	ND-0.6	ND-0.5	2.9-3.7	816-1 339
Palm kernel stearin***	1.4-1.7	ND-2.2	8.2-9.7	14.1-15.0	67.0-70.0	3.3-4.1	ND-0.3	ND-0.3	1.0-3.0	775-1 086
Palm stearin***	2.5-5.0	ND	15.0-26.0	9.0-15.0	50.0-60.0	ND-3.0	ND-3.0	ND-3.0	ND-5.0	250-500
Palm superolein***	2.0-3.5	ND	22.0-26.0	18.2-20.0	55.0-70.0	0-1.0	0-0.3	0-0.3	0-2.0	100

	Cholesterol	Brassicasterol	Campesterol	Stigmasterol	Beta-sitosterol	Delta-5-avenasterol	Delta-7-stigmastenol	Delta-7-avenasterol	Others	Total sterols (mg/kg)
Pistachio oil	ND-1.0	ND	4.0-6.5	0.5-7.5	75.0-94.0	6.0-8.0	ND-0.7	ND-0.5	ND	1 840-4 500
Rapeseed oil (low-erucic acid)	ND-1.3	5.0-13.0	24.7-38.6	0.2-1.0	45.1-57.9	2.5-6.6	ND-1.3	ND-0.8	ND-4.2	4 500-11 300
Rice bran oil	ND- 0.5	ND-0.3	11.0- 35.0	6.0- 40.0	25.0-67.0	ND- 9.9	ND-14.1	ND - 4.4	7.5-12.8	10 500-31 000
Sacha inchi oil	ND-1.0	ND-0.1	6.6-7.8	23.4- 27.0	51.6- 56.9	4.3-8.7	ND-0.3	ND-0.7	ND	2 080- 2 480
Safflower seed oil	ND- 0.7	ND-0.4	9.2-13.3	4.5-9.6	40.2-50.6	0.8-4.8	13.7-24.6	2.2-6.3	0.5-6.4	2 100-4 600
Safflower seed oil (high-oleic acid)	ND-0.5	ND-2.2	8.9-19.9	2.9-8.9	40.1-66.9	0.2-8.9	3.4-16.4	ND-8.3	4.4-11.9	2 000-4 100
Sesame seed oil	0.1-0.5	0.1-0.2	10.1-20.0	3.4-12.0	57.7-61.9	6.2-7.8	0.5-7.6	1.2-5.6	0.7-9.2	4 500-19 000
Soyabean oil	0.2-1.4	ND-0.3	15.8-24.2	14.9-19.1	47.0-60	1.5-3.7	1.4-5.2	1.0-4.6	ND-1.8	1 800-4 500
Soya bean oil (high-oleic acid)	0.2-0.5	0.2-0.3	19.9-25.2	17.3-23.0	42.3-51.9	1.9-3.0	0.6-2.5	0.5-1.5	4.5-7.1	2 300-3 850
Sunflower seed oil	ND-0.7	ND-0.2	6.5-13.0	6.0-13.0	50-70	ND-6.9	6.5-24.0	3.0-7.5	ND-5.3	2 400-5 000
Sunflower seed oil (high-oleic acid)	ND-0.5	ND-0.3	5.0-13.0	4.5-13.0	42.0-70	1.5-6.9	6.5-24.0	ND-9.0	3.5-9.5	1 700-5 200
Sunflower seed oil (mid-oleic acid)	0.1-0.2	ND-0.1	9.1-9.6	9.0-9.3	56-58	4.8-5.3	7.7-7.9	4.3-4.4	5.4-5.8	
Walnut oil	ND	ND	4.0-6.5	ND	70.0-92.0	0.5-6.0	ND-3.0	ND-2.0	ND	500-1 760

Notes:

¹ Data taken from species as listed in Section 2: "Description".

² Avocado oil also contains 1.0% - 2.5% clerosterol.

³ Fractionated product from palm oil.

ND - Non detectable, defined $\leq$ 0.05%

Table A4: Levels of tocopherols and tocotrienols in crude vegetable oils from authentic samples* (mg/kg) (see appendix)

	Alpha-tocopherol	Beta-tocopherol	Gamma-tocopherol	Delta-tocopherol	Alpha-tocotrienol	Gamma-tocotrienol	Delta-tocotrienol	Total (mg/kg)
Arachis oil	49-373	ND-41	88-389	ND-22	ND	ND	ND	170-1 300
Almond oil	20-545	ND-10	ND-104	ND-5	ND	ND	ND	20-600
Avocado oil	45-270	ND-36	ND-62	ND-70	ND-20	ND-20	ND-20	45-478
Babassu oil	ND	ND	ND	ND	25-46	32-80	9-10	60-130
Camellia seed oil	30-950	ND-11	2-56	ND-28	13-35	5-39	ND	100-1 000
Coconut oil	ND-17	ND-11	ND-14	ND	ND-44	ND-1	ND	ND-50
Cottonseed oil	136-674	ND-29	138-746	ND-21	ND	ND	ND	380-1 200
Flaxseed/linseed oil	2-265	ND	100-712	ND-14	ND	ND	ND	150-905
Grapeseed oil	16-38	ND-89	ND-73	ND-4	18-107	115-205	ND-3.2	240-410
Hazelnut oil	100-420	6-12	18-194	ND-10	ND	ND	ND	200-600
Maize oil**	23-573	ND-356	268-2 468	23-75	ND-239	ND-450	ND-20	330-3 720
Palm oil	4-193	ND-234	ND-526	ND-123	4-336	14-710	ND-377	150-1 500
Palm oil with a higher oleic acid	49-188	ND	4-138	ND-31	74-256	406-887	33-86	562-1 417
Palm olein***	30-280	ND-250	ND-100	ND-100	50-500	20-700	40-120	300-1 800
Palm kernel oil	ND-44	ND-248	ND-257	ND	ND	ND-60	ND	ND-260
Palm kernel olein***	ND-11	ND-6	ND-3	ND-4	ND-70	1-10	ND-2	ND-90
Palm kernel stearin***	ND-10	ND-2	ND-1	ND	ND-73	ND-8	ND-1	ND-89
Palm stearin***	ND-100	ND-50	ND-50	ND-50	20-150	10-500	5-150	100-700
Palm superolein***	130-240	ND-40	ND-40	ND-30	170-300	230-420	60-120	400-1 400

	Alpha-tocopherol	Beta-tocopherol	Gamma-tocopherol	Delta-tocopherol	Alpha-tocotrienol	Gamma-tocotrienol	Delta-tocotrienol	Total (mg/kg)
Pistachio oil	10-330	ND	0-100	ND-50	ND	ND	ND	100-600
Rapeseed oil (low-erucic acid)	100-386	ND-140	189-753	ND-22	ND	ND	ND	430-2 680
Rice bran oil	49-583	ND-47	ND-212	ND-31	ND-627	142-790	ND-59	191-2 349
Sacha inchi oil	3.0-7.0	ND-3.0	1 040-1 370	640-860	ND	ND	ND	1 683-2 240
Safflower seed oil	234-660	ND-17	ND-12	ND	ND	ND-12	ND	240-670
Safflower seed oil (high-oleic acid)	234-660	ND-13	ND-44	ND-6	ND	ND-10	ND	250-700
Sesame seed oil	ND-3.3	ND	521-983	4-21	ND	ND-20	ND	330-1 010
Soyabean oil	9-352	ND-36	89-2 307	154-932	ND-69	ND-103	ND	600-3 370
Soya bean oil (high-oleic acid)	17-138	9-106	89-1 756	44-570	ND-39	ND	ND	900-2 000
Sunflower seed oil	403-935	ND-45	ND-34	ND-7.0	ND	ND	ND	440-1 520
Sunflower seed oil (high-oleic acid)	400-1 090	10-35	3-30	ND-17	ND	ND	ND	450-1 120
Sunflower seed oil (mid-oleic acid)	488-668	19-52	2.3-19.0	ND-1.6	ND	ND	ND	509-741
Walnut oil	ND-170	ND-110	120-400	ND-60	ND	ND	ND	309-455

Notes:

* Data taken from species as listed in Section 2: "Description".

** Maize oil also contains ND-52 mg/kg beta tocotrienol.

*** Fractionated product from palm oil.

ND - Non detectable

REFERENCED TEXTS

- 1 *General standard for food additives* (CXS 192-1995).
- 2 *Guidelines for the use of flavourings* (CXG 66-2008).
- 3 *General standard for contaminants and toxins in food and feed* (CXS 193-1995).
- 4 *General principles of food hygiene* (CXC 1-1969).
- 5 *Principles and guidelines for the establishment and application of microbiological criteria related to foods* (CXG 21-1997).
- 6 *General standard for the labelling of pre-packaged foods* (CXS 1-1985).
- 7 *General standard for the labelling of non-retail containers of foods* (CXS 346-2021).
- 8 *Recommended methods of analysis and sampling* (CXS 234-1999).

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Food and Agriculture Organization of the United Nations

Rome, Italy

FAO and WHO. 2026. *Standard for named vegetable oils*. Codex Alimentarius Standard, No. CXS 210-1999. Codex Alimentarius Commission. Rome. <https://openknowledge.fao.org/handle/20.500.14283/cd9108en>

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