These sources of fat for confectionary products are not atherogenic but still their supply is not regular, provided these species are not usually crops but their fruits and seeds are harvested from the wild, moreover they are produced in areas with a poor communication and with irregular supply. These fats are usually mixed with some palm fractions rich in POP prior to be used in confectionary fat formulations.

Furthermore, in the last years new alternative sources of StOSt for confectionary have appeared. They come from oil crops that have been modified by genetic engineering by increasing their levels of stearic acid, such as soybean and oilseed rape. These are plants with seeds growing in green capsules or siliques, which involve the presence of linolenic acid in their oils in important amounts, and also linoleic acid. The presence of linolenic acid is not desired in confectionary fats due to the fact that it is unstable to oxidation and it possesses a very low melting point (-11ºC), which decreases their solid fat contents at room temperature or higher. These fats could be also used for plastic fats, to make spreads, shortening and margarine, displaying broad melting intervals. Examples of all these applications with fractionated oils can be found in WO99/57990 were high-stearic and high-oleic soybean oil is used to produce a fat suitable for confectionary, or in WO00/19832 were high-stearic and high-oleic rapeseed oil was used to make similar products, but unfortunately with some linolenic acid (18:3), and with less that 3% of solid content at temperatures above 33.3ºC. This is useful to make shortening and spreads, but is less suitable for confectionary.

High-stearic and high-oleic sunflower oils have also been fractionated to obtain olein fractions for frying oils (WO2008/006597) and to produce a fat suitable for structuring a liquid vegetable oil, making a typical spreadable fat with broad melting point (WO01/96507).

A need remains for alternative fats for use in confectionary products.

SUMMARY ~~OF THE INVENTION~~

In a first aspect, the present invention refers to a solid sunflower fat comprising in its triacylglycerol fraction between 49.1% and 95.5% triacylglycerol of the general formula SUS, between 32.5% and 74.3% triacylglycerol of the general formula StOSt, between 3.2 and 8.1% triacylglycerol of the general formula AOSt and between 3.3 and 10.3% triacylglycerol of the general formula BOSt and comprising between 0 and 0.5% linolenic acid, wherein the fatty acids in position sn-1 and sn-3 of the glycerol are the two external characters in the triacylglycerol formula, S represents a saturated fatty acid, U represents an unsaturated fatty acid, St represents stearic acid, O represents oleic acid, A represents arachidic acid and B represents behenic acid.

Disclosed herein is~~The present invention is based on~~ the finding that stearin fats, obtainable by dry or solvent fractionation of sunflower high-stearic and high-oleic oils,

optionally with seeding with tempered stearin crystals, have a high solid fat content at temperatures higher than 30ºC, even higher than cocoa butter or other high saturated tropical fats with a similar disaturated triacylglycerol content due to the presence of disaturated triacylglycerols rich in stearic, arachidic and behenic fatty acids. These triacylglycerols increase the melting point of the fat incrementing the content of solids at these temperatures, which helps to keep the properties of confectionary products, particularly when they are occasionally exposed to moderately high temperatures.

The novel sunflower fats as disclosed herein~~of the invention~~ do not have triacylglycerols that contain linolenic acid. In this regard, the fat of the invention is an alternative to CB or tropical fats that are rich in StOSt, such as shea, illipe, kokum or mango, for use in confectionary products.

The fat as disclosed herein~~of the invention~~ is not atherogenic, due to its high-oleic and high-stearic acid contents, which does not affect the levels of blood cholesterol. Moreover, it is trans-free and possesses very low amounts of saturated fatty acids in the sn-2 position.

The fat as disclosed herein~~of the invention~~ can be produced by physical means from high-stearic and high-oleic sunflower oil, which ensures a regular and reliable supply of this product. Furthermore, the fat as disclosed herein~~of the invention~~ is free (<0.5%) of linolenic acid and contains arachidic (A)and behenic (B)fatty acids esterified to the sn-1,3 position of the triacylglycerols, forming amongst others 1-arachidoyl-2-oleoyl-3-stearoyl-glycerol (AOSt) and 1- behenoyl-2-oleoyl-3-stearoyl-glycerol (BOSt) that confer a higher amounts of solids at room temperature than other confectionary fats, keeping a melting interval appropriate for confectionary.

In one example~~embodiment~~, there is disclosed~~the invention provides~~ a fat containing between at least 32.5%, preferably at least 40%, more preferably at least 50%, even more preferably at least 60%, most preferably 74.3% of the triacylglycerol StOSt, at least 3.2%, preferably at least 4.5%, more preferably at least 5.5%, most preferably 8.1% of AOSt and at least 3.3%, preferably at least 5%, more preferably at least 8%, most preferably 10.3% of BOSt in its triacylglycerol fraction, wherein the fatty acids in positions sn-1 and sn-3 of the glycerol are the two external characters in the triacylglycerol (TAG) formula and St represents

stearic acid, O represents oleic acid, A represents arachidic acid and B represents behenic acid. The fat as disclosed herein~~of the invention~~ is a non-hydrogenated, non-palmitic and non-lauric fat, it has not been transesterified and it is especially suitable for confectionary products.

In one example~~embodiment~~, there is disclosed~~the invention provides~~ a fat containing between 32.5% and 74.3%, preferably between 35 and 70%, more preferably between 40 and 60%, even more preferably between 45 and 55% of the triacylglycerol StOSt, between 3.2 and 8.1%, preferably between 4 and 7%, more preferably between 4.5 and 5.5% of AOSt and between 3.3 and 10.3%, preferably between 4.5 and 9%, more preferably between 5 and 8%, even more preferably between 6 and 7% of BOSt in its triacylglycerol fraction, wherein the fatty acids in positions sn-1 and sn-3 of the glycerol are the two external characters in the triacylglycerol (TAG) formula and St represents stearic acid, O represents oleic acid, A represents arachidic acid and B represents behenic acid. The fat as disclosed herein~~of the invention~~ is a non-hydrogenated, non-palmitic and non-lauric fat, it has not been transesterified and it is especially suitable for confectionary products.

In one example~~embodiment~~, the fat comprises in its triacylglycerol fraction at least 49.1% triacylglycerol of the general formula SUS.

Particular example~~embodiments~~ of the invention are fats having the following combinations of StOSt, AOSt, BOSt and SUS as in Table 3.

Table 3. Selected disaturated triacylglycerol content of some fats of this invention.

Fat	StOSt	AOSt	BOSt	SUS
SH 1	52.5	6.9	8.0	79.6
SH 2	57.5	8.0	10.3	87.5
SH 3	37.1	6.3	6.9	64.6
SH 4	52.5	6.9	8.0	79.0
SA 1	37.7	5.4	5.3	59.3
SA 2	57.8	7.7	5.0	79.3
SA 3	35.8	4.4	4.4	60.3
SA 4	32.5	3.2	3.3	49.1
SA 5	56.0	7.4	8.4	85.2

SH 5	39.9	6.9	7.9	71.3
SH 6	65.3	7.0	8.2	87.4
SH 7	67.3	7.4	8.3	90.6
SH 8	74.3	7.1	6.6	95.5
SA 6	42.8	5.8	5.8	67.2
SA 7	39.5	6.9	7.7	68.8
SA 8	41.4	6.8	7.1	71.8
SA 9	43.7	7.4	8.1	75.4
SA 10	46.9	8.1	8.4	80.5
SA 11	52.7	7.4	8.1	81.3
SA 12	53.2	7.2	7.5	82.1

Described herein is~~The present invention thus relates to~~ a high melting point stearin obtainable by solvent or dry fractionation, optionally seeding with tempered stearin crystals or optionally cooling down the oil to a temperature low enough to induce quick formation of crystal nuclei (i.e. the nucleation temperature), of previously known high-stearic high-oleic sunflower oil. The fat as disclosed herein~~of the invention~~ is especially appropriate as an alternative to cocoa butter and for the preparation of confectionary fats. The fat is trans-free and contains very low amounts of saturated fatty acids in the sn-2 position. This fat is rich in stearate and oleate, which are fatty acids that do not increase the levels of blood cholesterol in humans. Furthermore, their content of linolenic acid is negligible, thereby providing high oxidative stability.

The fat as disclosed herein~~of the invention~~ contains high enough levels of TAG of the type AOSt and BOSt in its composition to increase the amount of solids when compared with fats having similar amounts of stearic acid. This is of special interest for certain uses in confectionary and to avoid blooming in temperate climates. Blooming is caused by the loss of template of chocolate caused by high temperatures, producing undesirable whitish discoloration on the surface of chocolate products. The presence of fatty acids with chain lengths longer than stearic has a "memory" effect that helps to keep the correct template of confectionary.

The fats as disclosed hereinof the invention are prepared from high-stearic high-oleic sunflower oil that can for example be extracted from seeds as described in WO00/74470. A typical TAG composition of the oils disclosed in WO00/74470 includes StOSt, POSt, AOSt and BOSt but in amounts that are not enough to provide high solid fats. Therefore, those TAG have to be concentrated by dry or solvent fractionation to produce a fat with the levels of solids adequate for confectionary.

Dry fractionation involves cooling the oil to a temperature between 16 and 22ºC and keeping it at this temperature for up to 30 h, and subsequent filtration applying a pressure up to 10 bars to expel the remaining olein.

Fat fractions obtained after dry fractionation are sometimes not suitable for use as a CB alternative in confectionary. They are however suitable for preparing confectionary fats by further fractionation. Such fractions are for example SD1, SD2, SD3 and SD4 as described in the examples. Such fraction of high-stearic high-oleic oil for use as a starting product in the preparation of some solid fat of the invention comprises in its triacylglycerol fraction at least 30% triacylglycerol of the general formula SUS, between 20.8% and 74.3% triacylglycerol of the general formula StOSt, between 2.9 and 8.1% triacylglycerol of the general formula AOSt and between 3.1 and 10.3% triacylglycerol of the general formula BOSt, wherein the fatty acids in positions sn-1 and sn-3 of the glycerol are the two external characters in the triacylglycerol (TAG) formula, S represents a saturated fatty acid, U represents an unsaturated fatty acid, St represents stearic acid, O represents oleic acid, A represents arachidic acid and B represents behenic acid.

Solvent fractionation involves mixing the oil with an organic solvent following the cooling of the resulting micelles at temperatures lower than 15ºC.

Improved fractionation, in particular quicker fractionation, could be obtained by seeding oils at the beginning of fractionation with tempered stearin crystals or by cooling the oil to its nucleation temperature.

In one examplembodiment the solvent fractionation is performed with hexane as the solvent. When using high-stearic high-oleic oils or stearins from dry

fractionation, fractionation with hexane leads to fats that are comparable to CB with respect of their solids content at 35 °C.

The fat as described herein~~of the invention~~ is fully compatible with coca butter and can be blended with it in any proportion without causing a decrease of the melting point of the mixtures. This fat can assure a regular and controlled supply of confectionary fats since it can be produced from a temperate crop such as sunflower.

In a second aspect, the present invention refers to a method for the dry fractionation of high-stearic high-oleic sunflower oil, comprising the following steps: a) heating a high-stearic high-oleic oil up to about 60°C and decreasing the temperature to reach temperatures from 16 to 22°C, preferably 17 to 19°C, with soft stirring, while optionally adding tempered crystals for seeding, and maintaining the oil at this temperature for 20 to 50 hours, preferably between 24 to 35 hours; b) separating the solid stearin from the olein by filtration; c) pressing the stearin cake, preferably up to 5 bar, in particular up to 10 bar, even better up to 30 bar, to expel the remaining olein trapped in it.

In a third aspect, the present invention refers to a method for the solvent fractionation of high-stearic high-oleic sunflower oil, comprising the following steps: a) mixing a high-stearic high-oleic oil with an organic solvent, in particular acetone, hexane or ethyl ether; b) decreasing the temperature of the resulting micelle to -3 to 15°C, preferably between 2-10°C, with soft stirring, while optionally adding tempered crystals for seeding, and maintaining the oil at this temperature up to 96 hours; c) separating the solid stearin fraction by filtration; d) washing the solid phase with cold fresh solvent to remove the rest of the micelles entrapped into the precipitate; and e) removing the solvent, preferably by distillation at vacuum.

In a fourth aspect, the present invention refers to the use of a solid sunflower fat as defined above in a confectionary product.

In a fifth aspect, the present invention refers to a confectionary product including a solid sunflower fat as defined above.

DETAILED DESCRIPTION OF THE INVENTION

The object of the present invention is to provide a solid fat for confectionary that is healthy and can be produced from the commodity sunflower in countries with a temperate climate. This is achieved by the fact that it is prepared from high-stearic high-oleic sunflower oil. The composition of this fat makes it possible to have a high level of solids at room temperature and a melting interval adequate for confectionary applications.

The fat of the invention is prepared by fractionation of the above mentioned oil and satisfies the following requirements:

- it contains between 49.1 and 95.5% of TAG with the general formula SUS
- it contains between 32.5 and 74.3% of StOSt, and between 3.2 and 8.1% of the AOSt and between 3.3 and 10.3% of BOSt
- it contains between 0 and 0.5% linolenic acid
- it has a high solid fat content (38.9 to 94.5%) at temperature of 30ºC.

The fat of the invention is obtainable by low temperature dry fractionation applying the following steps:

a) heating a high-stearic high-oleic oil up to 60ºC and decreasing the temperature to reach temperatures from 16 to 22ºC, preferably 17 to 19ºC with soft stirring, while optionally adding tempered crystals for seeding, and maintaining the oil at this temperature for 20 to 50 hours, preferably between 24 to 35 hours;

b) separating the solid stearin from the olein by filtration;