NON-LAURIC, NON-TRANS, AND NON-TEMPERING TYPE CONFECTIONERY OIL OR FAT, AND PROCESS FOR PRODUCTION THEREOF

Technical Field

[0001]

The present invention relates to a non-lauric, non-trans and non-tempering type confectionery fat and oil which has good meltability in the mouth, good texture and good demolding property as well as high compatibility with cacao butter, and a process for producing the same. The present invention also relates to a chocolate that has high bloom resistance, good gross and good meltability in the mouth and that is prepared by using the fat and oil.

Background Art

[0002]

Traditionally, cacao butter is used as a typical confectionery fat and oil. Since cacao butter has very sharp melting characteristic around body temperature, cacao butter is used as fat and oil material for providing good meltability in the mouth and good texture in confectionery production. However, cacao butter contains disaturated-monounsaturated triglyceride which is a symmetric triglyceride as a major component and has crystalline polymorphism. Therefore, a tempering operation is

necessary to obtain a stable crystal at solidification.

However, the above-described tempering operation is very skillful. Therefore, a production method requiring no tempering process is often preferred in the confectionery industry. For this purpose, many studies for obtaining a vegetable fat and oil requiring no tempering process have been performed. As a result, a lauric acid type fat and oil and a high trans fatty acid-containing fat and oil are developed, and marketed. However, the lauric acid type fat and oil has a risk to generate an unpleasant soapy odor by hydrolysis when preserving it. And, the high trans fatty acid-containing fat and oil has a problem of health risk associated with trans fatty acid from a recent nutritional standpoint. Therefore, a non-tempering, non-lauric and non-trans confectionery fat and oil for substitute of them is desired.

[0003]

Recently, proposals for a non-lauric, non-trans and non-tempering type hard butter have been given as follows. For example, Patent Document 1 and Patent Document 2 disclose that SSU (1,2-disaturated-3-unsaturated triglyceride) is used as a main component for a chocolate without carrying out the tempering process. However, there are problems with costs and troublesome processes that SSU production requires an enzyme interesterification with a

lipase having 1,3-position-specificity and a fractionation step. In addition, Patent Document 3 describes that fat and oil having less than 1 of St (stearic acid): P (palmitic acid) ratio is obtained by adding 8 to 40 wt% of SSU component to more than 50 wt% of SUS (1,3-disaturated-2-unsaturated triglyceride) and that this fat and oil is used for a filling and the like without carrying out the tempering process. However, this fat and oil cannot provide heat resistance and snappiness similar to traditional coca butter and non-tempering type hard butter.

In addition, Patent Document 4 describes a fractionated fat and oil having 0.4 to 0.6 of SUS/SSU ratio by mass and 0.4 to 0.9 of St (stearic acid): P (palmitic acid) ratio. However, the fat and oil having this St/P ratio gives poor meltability in the mouth and poor texture when the fat and oil is used as a fat and oil for coating.

As described above, non-tempering type fat and oil having good bloom resistance and good texture in cacao butter-containing product similar to a high trans fatty acid-containing fat and oil, while the non-tempering type fat and oil is non-lauric and non-trans type, has not been obtained yet.

[0004]

Patent Document 1: JP 61-224934 A

Patent Document 2: JP 6-14717 A

Patent Document 3: JP 5-211837 A

Patent Document 4: JP 2009-284899 A

Disclosure of the Invention

Problems to be Solved by the Invention

[0005]

In the present invention, considerations for obtaining a non-lauric, non-trans and non-tempering type confectionery fat and oil which has good meltability in the mouth, good texture and good demolding property as well as high compatibility with cacao butter, excellent snappiness and excellent bloom resistance have been conducted.

[0006]

An object of the present invention is to provide a non-lauric and non-tempering and substantially non-trans confectionery fat and oil which maintains sharp meltability in the mouth, where it is different from conventional insufficient meltability in the mouth and waxy texture, and has high compatibility with cacao butter.

Means for Solving the Problems

[0007]

Then, the present inventors have intensively studied. As a result, the inventors surprisingly have found out that the above-described problems can be solved by adjusting a

ratio of amounts of trisaturated fatty acid, diglyceride and stearic acid in a fractionated fat and oil of palm oil-based random interesterified fat and oil.

[0008]

That is, the present invention is:

1) A non-lauric, non-trans and non-tempering type confectionery fat and oil which meets all of the following conditions (1) to (5);

2) The non-lauric, non-trans and non-tempering type confectionery fat and oil according to 1), wherein diglyceride content is 4 to 9 wt%;

3) A process for producing a confectionery fat and oil according to 1) or 2), which comprises adding 5% or more of fat or oil containing 25 wt% or more of stearic acid and 5 to 50 wt% of diglyceride to palm oil or fractionated palm oil, subjecting the obtained mixture to random interesterification, and subjecting the obtained interesterified fat and oil to fractionation;

4) A chocolate comprising a confectionery fat or oil according to 1) or 2);

(1) SSS content is 4 to 20 wt%;

(2) S2U content is 50 to 85 wt%;

(3) SUS/SSU (ratio by weight) is 0.4 to 0.8;

(4) Sum of SU2 content and U3 content is 5 to 30 wt%; and

(5) St/P (ratio by weight) is 0.1 to 0.4,

wherein S represents saturated fatty acid having 14 to 24 carbon atoms, U represents unsaturated fatty acid having 14 to 24 carbon atoms, St represents stearic acid and P represents palmitic acid.

Effect of the Invention

[0009]

The present invention can provide a non-lauric, non-tempering and non-trans confectionery fat and oil which maintains sharp meltability in the mouth, has a texture different from conventional waxy texture, and has high compatibility with cacao butter. In addition, a chocolate obtained by using the confectionery fat and oil of the present invention is allowed to contain the same blending amount of cacao butter as the case of using traditional high trans fatty acid-containing non-tempering fat and oil, and the chocolate has good taste and excellent bloom resistance.

Best Mode for Carrying Out the Invention

[0010]

The present invention will be more specifically described below.

A confectionery fat and oil of the present invention

is non-lauric, non-trans and non-tempering type confectionery fat and oil which meets all of the following conditions (1) to (5);

(1) SSS content is 4 to 20 wt%;

(2) S2U content is 50 to 85 wt%;

(3) SUS/SSU (ratio by weight) is 0.4 to 0.8;

(4) Sum of SU2 content and U3 content is 5 to30 wt%; and

(5) St/P (ratio by weight) is 0.1 to 0.4,

wherein S represents saturated fatty acid having 14 to 24 carbon atoms, U represents unsaturated fatty acid having 14 to 24 carbon atoms, St represents stearic acid and P represents palmitic acid.

[0011]

As used herein, "non-lauric" intends that a lauric fat and oil such as coconut oil and palm kernel oil is substantially not used as a raw material. More specifically, non-lauric means an amount of fatty acid having 6 to 12 carbon atoms in fatty acid composition of the confectionery fat and oil is less than 5 wt%, preferably less than 3 wt%.

In addition, as used herein, "non-trans" intends that a hydrogenated oil (except for a fully hydrogenated oil) is substantially not used as a raw material. More specifically, non-trans means an amount of trans fatty acid

in the constituent fatty acid is less than 2 wt%, preferably less than 1 wt%. A "non-tempering type" means that a chocolate can be prepared by skipping a temperature adjusting process (i.e., tempering process) and then cooling and solidifying when the chocolate is prepared by using this type fat and oil.

[0012]

(1) "SSS" means a triglyceride in which all constituent fatty acids are S. However, it does not mean that all constituent fatty acids have to be same saturated fatty acids having same chain length, and carbon atoms can be in the range from 14 to 24. It is necessary that SSS content in the confectionery fat and oil of the present invention is 4 to 20 wt%. And, this content is preferably 5 to 19 wt%, more preferably 7 to 13 wt%. When SSS content is less than 4 wt%, crystallization speed becomes slow, and the obtained chocolate cannot have appropriate hardness. In addition, solidification speed for an application of coating becomes slow. When this content is more than 20 wt%, snappiness and meltability in the mouth of the obtained chocolate are deteriorated.

(2) "S2U" means both triglyceride in which fatty acids in 1, 3 positions are S and fatty acid in 2 position is U (SUS) and triglyceride in which fatty acids in 1, 2 positions are S and fatty acid in 3 position is U (SSU).

It is preferable that chocolate is hard at room temperature and rapidly melts around body temperature. For giving such characteristics to chocolate, it is necessary that S2U content is 50 to 85 wt%. And, this content is preferably 55 to 80 wt%, more preferably 65 to 75 wt%. When S2U content is less than 50 wt%, the obtained chocolate is too soft at room temperature. When S2U content is more than 85 wt%, chocolate is too hard at room temperature. Deterioration of the texture is caused in both cases.

(3) It is necessary that SUS/SSU (ratio by weight) is 0.4 to 0.8. And this ratio is preferably 0.5 to 0.6. As described later, the confectionery fat and oil of the present invention is typically obtained by subjecting a raw material oil such as palm oil and/or fractionated palm oil to an interesterification with a metallic catalyst, and then subjecting to a fractionation, and then removing high melting point fraction and low melting point fraction. Therefore, SUS/SSU is typically about 0.5. It is also possible to add small amount of other confectionery fat and oil containing much SUS such as palm mid fraction (PMF). However, when this ratio is more than 0.8, bloom and graining tend to occur in the case of blending with cacao butter. When this ratio is less than 0.4, since an interesterification of fat and oil and a concentration by fractionation are necessary, there is a problem that

production costs become higher, and it is not preferable.

(4) "U3" means a triglyceride in which all constituent fatty acids are U. However, it does not mean that all constituent fatty acids have to be same unsaturated fatty acids having same chain length, and carbon atoms can be in the range from 14 to 24. It is necessary that sum of SU2 content and U3 content is 5 to30 wt%. And, this content is preferably 5.5 to 25 wt%, more preferably 5.5 to10 wt%.

Both S2U and U3 are hard to crystallize at room temperature and are triglycerides which exhibit behavior as a liquid component. When sum of SU2 and U3 content is less than 5 wt%, the obtained chocolate is too hard at room temperature and gives deteriorated texture. When this content is more than 30 wt%, since chocolate is too soft at room temperature, good snappiness cannot be obtained.

[0013]

(5) S in the confectionery fat and oil of the present invention substantially consists of St and P. It is necessary that St/P (ratio by weight) is 0.1 or more and 0.4 or less. This ratio is preferably 0.15 or more and 0.35 ore less. When St/P is less than 0.1 or more than 0.4, bloom and graining tend to occur in the case of blending with cacao butter. As used herein, "S substantially consists of St and P" means that total content of St and P based on S is 90 wt% or more, more preferably 95 wt% or

more.

[0014]

Diglyceride content is preferably 4 to 9 wt%, more preferably 4.5 to 8.0 wt%. When this content is less than 4 wt%, texture becomes too hard and it is not preferable. When this content is more than 9 wt%, a solidification speed becomes slow, a chocolate also becomes soft and bloom tend to occur, and it is not preferable.

[0015]

For example, the above-described non-lauric, non-trans and non-tempering type confectionery fat and oil of the present invention can be obtained by adding fully hydrogenated palm oil to palm oil and/or fractionated palm oil, subjecting the obtained mixture to random interesterification, and subjecting the obtained interesterified fat and oil to a fractionation. In addition, the non-lauric, non-trans and non-tempering type confectionery fat and oil of the present invention can also be obtained by adding 5% or more of fat and oil containing 25 wt% or more of stearic acid and 5 to 50 wt% of diglyceride to palm oil and/or fractionated palm oil, subjecting the obtained mixture to random interesterification, and subjecting the obtained interesterified fat and oil to a fractionation.

[0016]

Here, high melting point fraction and/or low melting point fraction which are generated by a process of producing StOSt lipid (St: stearic acid, O: oleic acid) as cacao butter substitute can be used as the fat and oil containing diglyceride and stearic acid. That is, highly-concentrated StOSt can be obtained by selectively introducing stearic acid into 1,3-positions of high oleic sunflower oil by using 1,3-position-specific lipase, and then removing high melting point fraction and low melting point fraction from the interesterified oil. The obtained high melting point fraction is used for adjusting diglyceride content and stearic acid content because the fraction has fat and oil composition in which 70 wt% or more of stearic acid and 20 wt% or more of diglyceride are contained in the constituent fatty acid. The obtained low melting point fraction is used for adjusting stearic acid content because main component of the fraction is StOO and contains 25 wt% or more of stearic acid. In addition, a low melting point fraction in which StOO is contained as major component obtained from shea butter, sal fat and the like can be used as substitute for the above-described low melting point fraction.

By blending such fat and oil having high diglyceride content and stearic acid content and palm oil, fat and oil having the above-described stearic acid content and

palmitic acid content can be obtained.

[0017]

As a method of random interesterification, both a method with chemical catalyst and a method with an enzyme can be applied. As the chemical catalyst, for example, alkaline metal catalyst such as sodium methylate can be used. As the enzyme, for example, lipase from genus *Alcaligenes* (*Alcaligenes*), genus *Penicillium* (*Penicillium*), genus *Thermomyces* (*Thermomyces*) and the like can be used, and the lipase can be used after immobilized to ion exchange resin or diatomite by well known method or can be used in powder form.

[0018]

The fat and oil of the present invention can be obtained by subjecting such obtained random interesterified fat and oil to fractionation method such as solvent fractionation and non-solvent fractionation, and then removing high melting point fraction or, high melting point fraction and low melting point fraction. A skilled person in the art can obtain fat and oil which meets the above-described conditions (1) to (6) without difficulty by adjusting yield of the fractionation depending on a composition of fat and oil before subjecting to the fractionation.

[0019]

An optional ingredient such as coloring agent, emulsifier, antioxidant and flavor used in a usual confectionery usage can be properly added to the fat and oil of the present invention. Amount of this ingredient is 20 wt% or less, preferably 10 wt% or less based on the fat and oil of the present invention.

[0020]

The above-described emulsifier includes glycerin fatty acid ester, sucrose fatty acid ester, sorbitan fatty acid ester, glycerin organic acid fatty acid ester, polyglycerin fatty acid ester, lecithin and the like.

[0021]

The confectionery fat and oil of the present invention obtained as mentioned above can be used as a fat and oil for chocolate by alone or in combination with cacao butter and allows to prepare chocolate without tempering process. As used herein, "chocolate" is not limited by rules ("Fair Competition Convention on the Show Kind of Chocolate") and ordinances, and includes various kinds of chocolates, for example, sweet chocolate, milk chocolate, white chocolate and color chocolate such as strawberry.

The fat and oil of the present invention has high compatibility with cacao butter, and around 20 wt% of cacao butter can be blended in the chocolate fat and oil. The obtained chocolate has good meltability in the mouth, good

snappiness and good bloom resistance.

Examples

[0022]

The Examples will be described in the following, but the technological thought of the present invention is not limited by the following Examples. In Examples, % and part mean a weight basis, unless otherwise specified.

[0023]

(Example 1)

A compounded oil composed of 74 wt% of palm high melting point fraction (iodine value: 40.0), 18 wt% of StOSt low melting point fraction and 8 wt% of StOSt high melting point fraction were subjected to random interesterification with sodium methylate to obtain interesterified oil 1. This interesterified oil 1 was subjected to acetone fractionation, and then the resulting high melting point fraction and the resulting low melting point fraction were removed to obtain non-lauric, non-trans and non-tempering type confectionery fat and oil of the present invention.

[0024]

The StOSt low melting point fraction and the StOSt high melting point fraction were produced as a by-product in the production of StOSt fat as cacao butter substitute.

More specifically, the fractions were obtained by hexane fractionation of a fat and oil which was obtained by interesterification of mixture of 30 wt% of high oleic sunflower oil and 70 wt% of stearic acid with commercially available 1,3-position-specific lipase. In the StOSt high melting point fraction, stearic acid content was 80 wt%, and diglyceride content was 23 wt%. In the StOSt low melting point fraction, stearic acid content was 29.0 wt%, and diglyceride content was 2.5 wt%.

[0025]

(Example 2)

A compounded oil composed of 68 wt% of palm high melting point fraction used in Example 1, 18 wt% of StOSt low melting point fraction also used in Example 1, and 14 wt% of fully hydrogenated palm oil were subjected to random interesterification with sodium methylate to obtain interesterified oil 2. This interesterified oil 2 was subjected to acetone fractionation, and then the resulting high melting point fraction and the resulting low melting point fraction were removed to obtain non-lauric, non-trans and non-tempering type confectionery fat and oil of the present invention.

[0026]

(Example 3)

A compounded oil composed of 78 wt% of palm high

melting point fraction used in Example 1, 18 wt% of StOSt low melting point fraction also used in Example 1, and 4 wt% of StOSt high melting point fraction were subjected to random interesterification with sodium methylate to obtain interesterified oil 3. This interesterified oil 3 was subjected to acetone fractionation, and then the resulting high melting point fraction and the resulting low melting point fraction were removed to obtain non-lauric, non-trans and non-tempering type confectionery fat and oil of the present invention.

[0027]

(Example 4)

A compounded oil composed of 82 wt% of palm high melting point fraction used in Example 1 and 18 wt% of StOSt low melting point fraction also used in Example 1 were subjected to random interesterification with sodium methylate to obtain interesterified oil 4. This interesterified oil 4 was subjected to acetone fractionation, and then the resulting high melting point fraction and the resulting low melting point fraction were removed to obtain non-lauric, non-trans and non-tempering type confectionery fat and oil of the present invention.

[0028]

(Example 5)

A compounded oil composed of 20 wt% of palm high

melting point fraction, 59 wt% of palm oil and 21 wt% of fully hydrogenated palm oil were subjected to random interesterification with sodium methylate to obtain interesterified oil 5. This interesterified oil 5 was subjected to acetone fractionation, and then the resulting high melting point fraction and the resulting low melting point fraction were removed to obtain non-lauric, non-trans and non-tempering type confectionery fat and oil of the present invention.

[0029]

(Example 6)

The confectionery fat and oil obtained in Example 5 and the high melting point fraction after the acetone fractionation in same Example were blended at a ratio of 90 parts to 10 parts to obtain non-lauric, non-trans and non-tempering type confectionery fat and oil of the present invention.

[0030]

(Comparative Example 1)

A compounded oil composed of 65 wt% of palm oil and 35 wt% of fully hydrogenated palm oil were subjected to random interesterification with sodium methylate to obtain interesterified oil. This interesterified oil was subjected to acetone fractionation, and then the resulting high melting point fraction and the resulting low melting

point fraction were removed to obtain non-lauric, non-trans and non-tempering type confectionery fat and oil.

[0031]

(Comparative Example 2)

A random interesterification with sodium methylate was carried out to 100 wt% of the palm high melting point fraction used in Example 1 to obtain interesterified oil. This interesterified oil was subjected to acetone fractionation, and then the resulting high melting point fraction and the resulting low melting point fraction were removed to obtain non-lauric, non-trans and non-tempering type confectionery fat and oil.

[0032]

(Comparative Example 3)

A compounded oil composed of 60 wt% of palm high melting point fraction used in Example 1, 18 wt% of SOS low melting point fraction also used in Example 1 and 22 wt% of SOS high melting point fraction were subjected to random interesterification with sodium methylate to obtain interesterified oil. This interesterified oil was subjected to acetone fractionation, and then the resulting high melting point fraction and the resulting low melting point fraction were removed to obtain non-lauric, non-trans and non-tempering type confectionery fat and oil.

[0033]

Analytical values of non-tempering type fats and oils of Examples and Comparative Examples are shown in Table 1.

(Table 1)

	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Comparative Example 1	Comparative Example 2	Comparative Example 3
SSS (%)	11	7.5	9.3	8.3	12.8	18.5	3.0	3.4	7.5
S2U (%)	70.7	71.4	74.5	73.7	74.8	67.5	85	67.8	70.2
Diglyceride (%)	7.3	5.4	5.0	5.2	4.9	4.9	5.1	5.5	11.6
St/P	0.31	0.3	0.23	0.17	0.30	0.31	0.49	0.1	0.61
SU2 + U3 (%)	9.0	8.0	8.7	8.5	5.9	7.1	7.3	8.0	9.9
SUS/SSU	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

[0034]

Chocolate masses were prepared by using the confectionery fats and oils obtained in Examples 1 to 5 and Comparative Examples 1 to 3 according to the formulation described in Table 2 and a conventional method.

[0035]

(Table 2)

Formulation of chocolate	(%)
Cacao mass	2
Cocoa powder	10
Cocoa butter	3.8
Whole milk powder	9
Sugar	44
Confectionery fat and oil	31.2
Lecithin	0.5
Vanillin	0.05

[0036]

The chocolate mass was poured into a cup at 60°C, and it was rapidly cooled and solidified by standing in a refrigerator at 5°C for 30 minutes without carrying out a tempering treatment.

Comparison of heat resistance and bloom resistance was carried out after stabilization of the chocolate by standing at 20°C for 1 week. The result is shown in Table 3. In the table, heat resistance is shown by the peak value of rheometer (using plunger of 3 mm in diameter). Bloom resistance is evaluation of the state of the chocolate after alternately standing under the environment

of 17°C and 30.5°C (1 cycle/day) and going through the prescribed days. The symbols show as follows: - (good), ± (gross disappearance), + (bloom generation), ++ (intensive bloom).

Evaluation of texture shows as follows: ⊙ (excellent), ○ (good), Δ (slightly bad), × (bad).

(Table 3) Test result of chocolates

	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Comparative Example 1	Comparative Example 2	Comparative Example 3
Heat resistance (g)									
27°C	800	1200	710	640	860	1380	1500	34	1200
28°C	310	600	305	280	520	710	800	-	600
29°C	200	330	180	140	260	390	400	-	300
30°C	24	38	22	20	30	66	82	-	42
Bloom resistance									
2 (days)	-	-	-	-	-	-	-	±	-
21	-	-	-	-	-	-	-	++	+
49	-	-	-	-	-	-	-	++	++
70	-	-~±	±	±	-	-	±	++	++
Texture	⊙	○	○	○	⊙	○	×	Δ	Δ

[0037]

As shown in the above-described results, the chocolates prepared by using confectionery fats and oils of Examples 1 to 6 showed good texture and good bloom resistance unlike conventional non-tempering type fat and oil. The chocolate prepared by using confectionery fat and oil of Comparative Example 1 showed heat resistance, but had poor meltability in the mouth and gave waxy after-texture in the mouth due to too hard composition, and it was bad. In Comparative Example 2, poor heat resistance was shown, shape retaining property was not obtained, and also poor bloom resistance was shown. In Comparative Example 3, similar texture and heat resistance were obtained, but bloom resistance was inferior, as compared with Examples. In Example 2, meltability in the mouth tended to be slightly inferior as compared with the other Examples due to its harder composition, but texture was similar to the other Examples.

Industrial Applicability

[0038]

The non-lauric, non-trans and non-tempering type confectionery fat and oil of the present invention allows to provide texture and bloom resistance unlike conventional non-lauric, non-trans and non-tempering type fat and oil to

chocolate by having specific triglyceride composition, specific St/P ratio and specific diglyceride content.

CLAIMS

1. A non-lauric, non-trans and non-tempering type confectionery fat and oil which meets all of the following conditions:

(1) SSS content is 4 to 20 wt%;

(2) S2U content is 50 to 85 wt%;

(3) SUS/SSU (ratio by weight) is 0.4 to 0.8;

(4) Sum of SU2 content and U3 content is 5 to 30 wt%; and

(5) St/P (ratio by weight) is 0.1 to 0.4,

wherein S represents saturated fatty acid having 14 to 24 carbon atoms, U represents unsaturated fatty acid having 14 to 24 carbon atoms, St represents stearic acid and P represents palmitic acid.

2. The non-lauric, non-trans and non-tempering type confectionery fat and oil according to claim 1, wherein diglyceride content is 4 to 9 wt%.

3. A process for producing a confectionery fat and oil according to claim 1 or 2, which comprises adding 5% or more of fat or oil containing 25 wt% or more of stearic acid and 5 to 50 wt% of diglyceride to palm oil or fractionated palm oil, subjecting the obtained mixture to

random interesterification, and subjecting the obtained interesterified fat and oil to fractionation.

4. A chocolate comprising a confectionery fat or oil according claim 1 or 2.