Description

Title of Invention

FOAMABLE OIL-IN-WATER EMULSION CONTAINING SEED PASTE

Technical Field

[0001]

The present invention relates to a foamable oil-in-water emulsion containing a seed paste such as an almond paste.

Background Art

[0002]

There is an increasing need for products in which animal food products and dairy products are replaced with vegetable materials in view of protection of environment and resources, consideration for health, and the like. For example, as alternatives to cow's milk, there are a group of products called vegetable milk or plant milk made from soybeans, oats, almonds, coconuts, and the like.

[0003]

In general creams and whipped creams, casein, which is a milk protein, contributes to oil-in-water emulsification. Thus, to produce a whipped cream in which no dairy product is used, a technique for supplementing this function is required.

Patent Document 1 is an invention relating to a foamable oil-in-water emulsion using only a vegetable material, and a partial decomposition product of soybean protein, which is a plant protein having emulsifying capacity, is blended in the foamable oil-in-water emulsion.

On the other hand, there is also a situation in which a means that does not rely on soybeans or legume raw materials is required, such as subdivision of needs in the vegetable food trend or measures against allergies.

[0004]

Seeds such as an almond are greatly needed particularly in western confectionery, cafes, and the like, and a vegetable whipped cream containing seeds is required.

To impart a natural flavor of seeds, it is desirable to blend a certain amount or more of a raw material in a paste form, that is, a seed paste. However, there is a problem that, when the paste is simply blended, the viscosity of the foamable oil-in-water emulsion is increased. In addition, a liquid oil component abundantly contained in seeds may act to inhibit foamability.

That is, it is difficult to produce a foamable oil-in-water emulsion having good physical properties without blending a milk component and without using a legume protein or a decomposition product thereof while containing a seed paste.

[0005]

Patent Document 2 discloses a method for producing a foamable oil-in-water emulsified fat in which an increase in viscosity during mixing and emulsification is suppressed by setting a

particle size of an almond paste to 80 to 400 mesh. However, Examples contain sodium caseinate and thus, Patent Document 2 does not disclose a production method without using a dairy product.

Citation List

Patent Literature

[0006]

Patent Document 1: JP 2020-115854 A

Patent Document 2: JP 62-22562 A

Summary of Invention

Technical Problem

[0007]

The present invention is to provide a vegetable whipped cream containing a seed paste such as an almond paste, containing no milk component, and having a good flavor and physical properties.

Solution to Problem

[0008]

As a result of intensive studies, the present inventors have found that the problem described above is solved by blending certain amounts of a hydrogenated palm kernel oil having a slip melting point of 33 to 40°C and a specific interesterified oil and fat, and have completed the present invention.

[0009]

Namely, the present invention is as follows.

(1) A foamable oil-in-water emulsion containing 1 to 10 wt.% of a seed paste, 1 to 12 wt.% of a hydrogenated palm kernel oil having a slip melting point of 33 to 40°C, and 2.5 to 12 wt.% of an interesterified oil and fat satisfying all the following conditions (i) to (iii):

(i) a palm oil and/or an oil and fat obtained by processing a palm oil is contained as an oil and fat source;

(ii) a content of a saturated fatty acid having 16 to 18 carbon atoms in a constituent fatty acid composition is 15 to 65 wt.%; and

(iii) a total amount of a saturated fatty acid having 6 to 10 carbon atoms and an unsaturated fatty acid having 18 carbon atoms in the constituent fatty acid composition is 20 to 60 wt.%.

(2) The foamable oil-in-water emulsion according to (1), wherein the interesterified oil and fat satisfies the following condition (iv):

(iv) a content of a saturated fatty acid having 6 to 14 carbon atoms in the constituent fatty acid composition is 10 to 50 wt.%.

(3) The foamable oil-in-water emulsion according to (1) or (2), wherein a weight ratio of the interesterified oil and fat to the seed paste is 0.8 or more.

(4) The foamable oil-in-water emulsion according to any one of (1) to (3), wherein the foamable oil-in-water emulsion is free of a milk component.

(5) A method for producing an oil-in-water emulsion described in any one of (1) to (4), the method including an enzyme treatment process using cellulase.

Advantageous Effects of Invention

[0010]

According to the present invention, a vegetable whipped cream having a natural flavor of seeds can be provided.

Description of Embodiments

[0011]

Hereinafter, the present invention will be described in detail.

[0012]

Foamable oil-in-water emulsion

A foamable oil-in-water emulsion of the present invention is an oil-in-water emulsion containing an oil and fat and water, and contains 1 to 10 wt.% of a seed paste. The foamable oil-in-water emulsion, which is an emulsion in a fluidized state, is stirred by a whipper, a mixer, or the like and thus foamed to incorporate air therein, whereby a "whipped cream" is obtained.

[0013]

Hydrogenated palm kernel oil

The foamable oil-in-water emulsion of the present invention contains 1 to 12 wt.%, preferably 1.5 to 10 wt.%, and more preferably 1.5 to 9.5 wt.% of a hydrogenated palm kernel oil having a slip melting point of 33 to 40°C.

When the slip melting point is less than 33°C, emulsion stability of the foamable oil-in-water emulsion may be lowered, and when it exceeds 40°C, mouth melt of the foamable oil-in-water emulsion may deteriorate. In addition, when the content is less than this range, the emulsion stability of the foamable oil-in-water emulsion may be lowered, and when it exceeds this range, the mouth melt of the foamable oil-in-water emulsion may deteriorate.

[0014]

Interesterified oil and fat

The foamable oil-in-water emulsion of the present invention contains an interesterified oil and fat, and a palm oil and/or an oil and fat obtained by processing a palm oil is contained as an oil and fat source for the interesterification. Examples of the oil and fat obtained by processing a palm oil include a hydrogenated palm oil, a fractionated and hydrogenated palm oil, and a fractionated palm oil.

The interesterified oil and fat has a content of a saturated fatty acid having 16 to 18 carbon atoms of 15 to 65 mass%, and a total amount of a saturated fatty acid having 6 to 10 carbon atoms and an unsaturated fatty acid having 18 carbon atoms of 20 to 60 wt.% in its constituent fatty acid composition. Furthermore, the interesterified oil and fat more preferably has a content of a saturated fatty acid having 6 to 14 carbon atoms of 10 to 50 wt.% in its constituent fatty acid composition.

As long as the above constitution is satisfied, oils and fats used as raw materials for interesterification are not limited except a palm oil and/or a processed oil and fat thereof, and a plurality of interesterified oils and fats may be mixed. In particular, it is preferable to use one or more type selected from the group consisting of a palm kernel oil, a coconut oil, a rapeseed oil, a sunflower oil, a cottonseed oil, a corn oil, a shea butter, and processed oils and fats thereof, and more preferably, one or more type selected from a palm kernel oil and/or oils and fats obtained by processing a palm oil are used, whereby preparation of an interesterified oil and fat satisfying all the constitutions described above is facilitated. Examples of the oil and fat obtained by processing a palm kernel oil include a palm kernel hydrogenated oil, a fractionated and hydrogenated palm kernel oil, and a fractionated palm kernel oil. A method for producing an interesterified oil and fat is not particularly limited, and may be a method using a chemical catalyst such as sodium methylate, a method using an enzyme such as lipase, a non-selective randomized reaction, or a selective interesterification reaction having positional specificity.

[0015]

The interesterified oil and fat is blended in an amount of 2.5 to 12 wt.%, preferably 2.5 to 10 wt.%, in the foamable oil-in-water emulsion. When the blended amount is small or too large, the emulsion stability of the foamable oil-in-water emulsion may be lowered.

[0016]

Furthermore, it is desirable to blend the interesterified oil and fat in such a manner that a weight ratio of the interesterified oil and fat to the blended amount of the seed paste is 0.8 or more, that is, “interesterified oil and fat: seed paste ≥ 0.8” is satisfied. The weight ratio is desirably 0.9 or more, and more preferably 1.0 or more. When the weight ratio is less than this range, it may be difficult to obtain a foamable oil-in-water emulsion having good emulsion stability.

[0017]

The foamable oil-in-water emulsion of the present invention may contain oils and fats other than the oils and fats described above, and any of vegetable oils and fats such as a soybean oil, a rapeseed oil, a canola oil, a safflower oil, a sunflower oil, a rice bran oil, a corn oil, a cotton seed oil, a peanut oil, a Kapok oil, an olive oil, a palm oil, a palm kernel oil, and a coconut oil, as well as hydrogenated, fractionated, or interesterified products thereof can be used. These may be used alone, or two or more types of them may be blended to be used.

An oil and fat content (oil content) in the foamable oil-in-water emulsion of the present invention is 25 to 50 wt.%, preferably 30 to 45 wt.%, and more preferably 33 to 45 wt.% in total

with the oil content derived from the seed paste. When the content is smaller or larger than this range, the emulsion stability may be lowered.

[0018]

Seed paste

The foamable oil-in-water emulsion of the present invention contains 1 to 10 wt.% of a seed paste. The content is preferably 2 to 9 wt.%, and more preferably 2 to 8 wt.%. When the content is less than this range, it may be difficult to obtain a natural flavor derived from the seed, and when the content is more than this range, emulsification may become unstable.

Examples of the seed include an almond, a cashew, a walnut, a macadamia nut, a marron, a peanut, a pistachio, and a sesame. These seeds may be ground to form a paste for use. In particular, an almond paste prepared from almonds is suitable.

[0019]

Cellulase

In the present invention, excessive thickening of the foamable oil-in-water emulsion can be suppressed by performing enzyme treatment with cellulase during the production process. The enzyme reaction proceeds simultaneously during the ordinary production process of the foamable oil-in-water emulsion, and thus it is often unnecessary to add a separate step. The reaction conditions can be exemplified by a temperature of 50 to 70°C for 20 minutes or longer. As the cellulase, a commercially available preparation can be used, and an addition amount may be appropriately adjusted depending on the activity and purity thereof. For example, 0.01 to 1% in the foamable oil-in-water emulsion can be exemplified.

[0020]

Emulsifier

In the foamable oil-in-water emulsion of the present invention, any commonly used emulsifier can be used. Specific examples thereof include emulsifiers such as lecithin, enzymatically decomposed lecithin, glycerin fatty acid ester, organic acid monoglyceride, polyglycerin fatty acid ester, propylene glycol fatty acid ester, polyglycerin-condensed ricinoleic acid ester, sorbitan fatty acid ester, sucrose fatty acid ester, polyoxyethylene sorbitan fatty acid ester, and polysorbate, and one or more types of these can be appropriately selected and used.

In the present invention, one or more types selected from the group consisting of lecithin, sucrose fatty acid ester, polyglycerin fatty acid ester, organic acid monoglyceride, and polysorbate are particularly preferable, and sucrose fatty acid ester having an HLB of 2 to 6 is more preferably contained.

A blended amount of the emulsifier is preferably 0.05 to 3 wt.%, more preferably 0.1 to 2 wt.%, and even more preferably 0.3 to 1.5 wt.% in total in the foamable oil-in-water emulsion.

[0021]

Milk component

According to the method of the present invention, a foamable oil-in-water emulsion having good physical properties can be obtained without containing a dairy product, that is,

casein which is a milk component, and thus a whipped cream that meets the needs of vegetable food can be provided. Furthermore, the foamable oil-in-water emulsion can be produced without blending any of a legume protein having emulsifying capacity, and a decomposition product and a partial decomposition product thereof.

[0022]

Other raw materials and production method

In the foamable oil-in-water emulsion, a perfume, a thickening polysaccharide, a gelling agent, a salt, a chelating agent, a saccharide, or the like can be blended as appropriate within a range that does not impair the effects of the present invention. The foamable oil-in-water emulsion may be produced by a common method. First, an oil and fat are melted, and an oil-soluble raw material, specifically, for example, an oil-soluble emulsifier is dissolved therein to prepare an oil phase. Separately, a water-soluble raw material is dissolved in water to prepare an aqueous phase, the aqueous phase is stirred with a homogenizer or the like, the oil phase is added to prepare an oil-in-water emulsion, and the emulsion is further emulsified with a high-pressure homogenizer. As needed, a sterilization process may be added.

Examples

[0023]

Hereinafter, Examples and Comparative Examples will be described to explain the present invention in more detail. Note that in the following description, “%” and “part(s)” mean weight basis unless otherwise specified.

[0024]

Production of interesterified oil and fat A

Random interesterification was performed using a palm kernel oil and a palm oil, and an interesterified oil and fat A was obtained. A fatty acid content in the constituent fatty acid composition and a slip melting point are listed in Table 1.

Note that the fatty acid composition was measured in accordance with the method specified in Japanese Oil Chemists' Society Standard Oil Analysis Test Method (1996 edition) 2.4.1.2 Methyl Esterification Method (boron trifluoride-methanol method).

[0025]

Production of interesterified oil and fat B

Random interesterification was performed using a palm oil and a rapeseed oil as raw materials, and an interesterified oil and fat B was obtained. A fatty acid content in the constituent fatty acid composition and a slip melting point are listed in Table 1.

[0026]

Table 1 Fatty acid composition of interesterified oil and fat (C: carbon atom)

	Total amount of C6-14 saturated fatty acid (%)	Total amount of C16-18 saturated fatty acid (%)	Total amount of C6-10 saturated fatty acid and C18 unsaturated fatty acid (%)	Slip melting point
Interesterified oil and fat A	23.8	45.4	51.3	32°C
Interesterified oil and fat B	1.3	45.4	51.4	39°C

[0027]

Production of foamable oil-in-water emulsion

According to formulations listed in Tables 2 and 3, oils and fats were heated and melted, and oil-soluble components (lecithin and an emulsifier) were added thereto, mixed, and dissolved to obtain an oil phase. Separately, water-soluble components (almond paste, sodium citrate, and cellulase) were dissolved in warm water to adjust an aqueous phase. The oil phase and the aqueous phase were mixed in an emulsification tank, pre-emulsified, homogenized, then sterilized by an ultra-high temperature sterilizer and immediately cooled, and a foamable oil-in-water emulsion was obtained.

[0028]

In the tables, the following raw materials were used.

Hydrogenated palm kernel oil: “New Melalin 38” (melting point 38°C), available from Fuji Oil Co., Ltd.

Almond paste: dehulled almond paste, available from Tokainuts Corporation

Emulsifier: sucrose fatty acid ester having an HLB of 5

Cellulase: Cellulase A “Amano” 3, available from Amano Enzyme Inc.

[0029]

Table 2 Blending unit: parts by weight

	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Example 8	Example 9	Example 10
Interesterified oil and fat A	8.0	8.0	8.0	8.0	8.0	4.0	3.0	3.0	9.0	-
Interesterified oil and fat B	-	-	-	-	-	-	-	-	-	8.0
Hydrogenated palm kernel oil	8.0	4.0	3.0	8.0	2.0	8.0	8.0	3.0	9.0	8.0
Palm kernel oil	19.0	23.0	24.0	19.0	25.0	23.0	24.0	29.0	21.0	19.0
Almond paste	3.0	4.0	4.0	6.0	6.0	4.0	4.0	4.0	4.0	4.0
Water	62.0	59.0	59.0	59.0	59.0	59.0	59.0	61.0	57.0	61.0
Lecithin	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Emulsifier	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Sodium citrate	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30

Cellulase	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Ratio of interesterified oil and fat: almond paste	2.7	2.0	2.0	1.3	1.3	1.0	0.8	0.8	2.3	2.0

[0030]

Table 3 Blending unit: parts by weight

	Comparative Example 1	Comparative Example 2	Comparative Example 3	Comparative Example 4	Comparative Example 5	Comparative Example 6
Interesterified oil and fat A	0.0	0.0	2.0	4.0	4.0	8.0
Hydrogenated palm kernel oil	2.0	8.0	8.0	8.0	4.0	8.0
Palm kernel oil	33.0	27.0	25.0	23.0	27.0	19.0
Almond paste	6.0	6.0	6.0	6.0	6.0	6.0
Water	59.0	59.0	59.0	59.0	59.0	59.0
Lecithin	0.20	0.20	0.20	0.20	0.20	0.20
Emulsifier	0.30	0.30	0.30	0.30	0.30	0.30
Sodium citrate	0.30	0.30	0.30	0.30	0.30	0.30
Cellulase	0.03	0.03	0.03	0.03	0.03	0.00
Ratio of interesterified oil and fat: almond paste	-	-	0.3	0.7	0.7	1.3

[0031]

Evaluation

The resulting foamable oil-in-water emulsion was subjected to the following measurement to judge whether it was acceptable or not.

[0032]

Viscosity (Unit: cP)

Measurement conditions: product temperature 5°C

Measurement instrument: BM viscometer (“VISCOMETER TV-10” available from Toki Sangyo Co., Ltd.), rotor Nos. 2 and 3

A viscosity of 10 cP or higher and 1500 cP or lower was regarded as acceptable.

[0033]

Emulsion stability

In a 100 ml beaker, 50 g of the foamable oil-in-water emulsion was charged and held at 20°C for 2 hours, and a ceramic ball was added thereto. Then, the mixture was shaken using a horizontal shaker, and an initiation time of clumping (significant increase in viscosity, solidification) was measured. An initiation time of 7 minutes or longer was regarded as acceptable.

[0034]

Whipping time

80 g of sugar was added to 1 kg of the foamable oil-in-water emulsion and the mixture was whipped at the third speed using a Hobart mixer N50 (available from Hobart Japan K.K.). A time required to reach the optimum foamed state was measured, and a time of 7 minutes or less was regarded as acceptable.

[0035]

Whipped product specific weight

A specific weight of the foamable oil-in-water emulsion in the optimum foamed state was measured, and a specific weight of 0.35 to 0.55 was regarded as acceptable.

[0036]

Whipped product hardness (Unit: gf)

The foamable oil-in-water emulsion in the optimum foamed state was placed in a cup having a diameter of 8 cm and a volumn of 200 ml, and a hardness of the emulsion was measured by a rheometer (available from Fudo Kogyo Co., Ltd.) with a disk-shaped plunger having a diameter of 3 cm. A hardness of 60 to 150 gf was regarded as acceptable.

[0037]

The results are listed in Tables 4 and 5. When the almond paste was blended and the hydrogenated palm kernel oil and the interesterified oil and fat (A or B) were used, the physical properties of the emulsion were stabilized, and thus a foamable oil-in-water emulsion having a good whipping property was obtained. It was necessary to blend the interesterified oil and fat in a certain amount or more with respect to the almond paste.

[0038]

Table 4 Measurement results and judgment of acceptance

		Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Example 8	Example 9	Example 10
Evaluation of emulsion	Viscosity (cP)	74	154	206	215	1224	144	238	179	364	138
	Emulsion stability (clumping initiation time)	20 minutes or longer	20 minutes or longer	20 minutes or longer	20 minutes or longer	20 minutes or longer	20 minutes or longer	20 minutes or longer	9'18"	7'21"	20 minutes or longer
Whipping test	Whipping time	6'02"	3'08"	3'29"	3'28"	3'26"	5'00"	5'10"	3'08"	2'41"	6'01"
	Specific weight	0.40	0.37	0.39	0.42	0.41	0.39	0.40	0.39	0.42	0.40
	Hardness (gf)	68	67	70	64	68	68	66	72	83	69
Judgment of acceptance		Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable

[0039]

Table 5 Measurement results and judgment of acceptance

		Comparative Example 1	Comparative Example 2	Comparative Example 3	Comparative Example 4	Comparative Example 5	Comparative Example 6
Evaluation of emulsion	Viscosity (cP)	1443	1418	2000 or greater	2000 or greater	2000 or greater	2000 or greater
	Emulsion stability (clumping initiation time)	1'55"	5'37"	11'30"	1'01"	Clumping occurs before starting test.	20 minutes or longer
Whipping test	Whipping time	2'45"	3'08"	3'19"	×	×	3'42"
	Specific weight	0.42	0.41	0.40	×	×	0.41
	Hardness (gf)	65	69	68	×	×	58
Judgment of acceptance		Unacceptable	Unacceptable	Unacceptable	Unacceptable	Unacceptable	Unacceptable

In the table, × indicates “unwhippable”.

Claims

[Claim 1]

A foamable oil-in-water emulsion containing 1 to 10 wt.% of a seed paste, 1 to 12 wt.% of a hydrogenated palm kernel oil having a slip melting point of 33 to 40°C, and 2.5 to 12 wt.% of an interesterified oil and fat satisfying all the following conditions (i) to (iii):

(i) a palm oil and/or an oil and fat obtained by processing a palm oil is contained as an oil and fat source;

(ii) a content of a saturated fatty acid having 16 to 18 carbon atoms in a constituent fatty acid composition is 15 to 65 wt.%; and

(iii) a total amount of a saturated fatty acid having 6 to 10 carbon atoms and an unsaturated fatty acid having 18 carbon atoms in the constituent fatty acid composition is 20 to 60 wt.%.

[Claim 2]

The foamable oil-in-water emulsion according to claim 1, wherein the interesterified oil and fat satisfies the following condition (iv):

(iv) a content of a saturated fatty acid having 6 to 14 carbon atoms in the constituent fatty acid composition is 10 to 50 wt.%.

[Claim 3]

The foamable oil-in-water emulsion according to claim 1 or 2, wherein a weight ratio of the interesterified oil and fat to the seed paste is 0.8 or more.

[Claim 4]

The foamable oil-in-water emulsion according to any one of claims 1 to 3, wherein the foamable oil-in-water emulsion is free of a milk component.

[Claim 5]

A method for producing the oil-in-water emulsion described in any one of claims 1 to 4, the method comprising an enzyme treatment process using cellulase.