PLANT-BASED SIMULATED KAYA AND EGG WHITE COMPOSITIONS

FIELD

The present invention is directed to plant-based simulated kaya compositions, and plant-based simulated egg white compositions which can be used as an egg white substitute in beverages such as cocktails, and methods of producing such compositions.

BACKGROUND

It is well-known that some characteristics of egg and egg products are often cause for concern, and otherwise impede the ability for some people to consume food containing egg products. For example, many individuals may be unable to, or would prefer not to consume egg products due to egg allergies, health concerns associated with cholesterol, culinary preferences (such as a Vegetarian or vegan diet), use of antibiotics and hormones during poultry production, and diseases associated with poultry (such as, for example, bird flu). Additionally, the high cost and/or cost fluctuations in the price of eggs and the contamination by salmonella carried by eggs have also been a concern of food manufacturers. In addition, the world's ability to provide a growing population with adequate and nutritious food is becoming fragile due to environmental degradation and climate change.

Kaya is a coconut jam that comprises coconut cream, egg yolks, pandan juice and sweetening agents and is very popular in Southeast Asia. It is usually spread over hot buttered toast. Egg yolk is primarily added to provide thickening and emulsifying effects. Non-vegan kaya is high in calories and cholesterol due to the amount of egg yolk used.

Raw egg whites are often used in cocktail application due to their ability to provide a good foam head in drinks and smooth mouthfeel such as fizzes and sours. However, raw egg whites pose many disadvantages such as the risk of Salmonella, short shelf life as well as the undesirable odour.

There is a need for alternatives to conventional kaya and the egg whites used in beverages, which retain the functionality of, but do not require, animal-derived eggs, particularly avian eggs, more specifically chicken eggs or their components.

SUMMARY

The present invention is directed to plant-based vegan egg compositions and methods of producing such compositions. More particularly, the invention provides vegan simulated kaya compositions which, compared to traditional kaya, are lower in sugar, higher in dietary fiber and are cholesterol-free. This is achieved by replacing egg yolks with sucrose ester, corn starch, plant protein, plant fiber and reducing the sugar content. The invention also provides a vegan “egg white” liquid as an alternative to normal raw egg whites. This liquid mix is able to create a consistent and stable froth without posing any health risk and without any unpleasant odour.

In a first aspect, the invention provides a plant-based vegan simulated kaya composition, comprising coconut cream, pandan juice, sweetening agent, sucrose ester, corn starch, plant protein, plant fiber, and water.

In some embodiments of the plant-based vegan simulated kaya composition;

a) the plant protein is soy protein; and/or

b) the pandan juice is selected from the group comprising pandan juice and pandan food flavor with green food color; and/or

c) the sweetening agent is a combination of white sugar, brown sugar and maltitol; and/or

d) the plant fiber is selected from the group comprising soluble pea fiber, oat and psyllium.

In some embodiments, the plant protein is soy protein isolate.

In some embodiments, the plant-based vegan simulated kaya composition comprises; coconut cream in an amount of about 47-48 wt%, pandan juice in an amount of about 9 to about 10 wt%, sweetening agent in an amount of about 21 to about 29 wt%, sucrose ester in an amount of about 0.15 to about 0.2 wt%, corn starch in an amount of about 1.4 to about 1.6 wt%, plant protein in an amount of about 1.1 to about 1.5 wt%, pea fiber in an amount of about 0.35 to about 0.7 wt% and water in an amount of about 9 to about 20 wt%, by weight of said simulated kaya composition.

In some embodiments, the sweetening agent comprises white sugar in an amount of about 4 to about 5 wt%, brown sugar in an amount of about 4 to about 5 wt% and maltitol in an amount of about 13 to about 19 wt%, by weight of said simulated kaya composition.

In some embodiments, the plant-based vegan simulated kaya composition comprises; coconut cream in an amount of about 47.5 wt%, pandan juice in an amount of about 10 wt%, white sugar in an amount of about 5 wt%, brown sugar in an amount of about 5 wt% and maltitol in an amount of about 15 wt%, sucrose ester in an amount of about 0.19 wt%, corn starch in an amount of about 1.53 wt%, plant protein in an amount of about 1.28 wt%, pea fiber in an amount of about 0.45 wt% and water in an amount of about 14.05 wt%, by weight of said simulated kaya composition.

In a second aspect the invention provides a method of producing a vegan simulated kaya composition of the first aspect, comprising the steps:

i) in a blender, mix sucrose ester, corn starch, plant protein, water, and plant fiber until a homogeneous mixture is achieved;

ii) add coconut cream, sweetening agents, and pandan juice into a saucepan over medium heat and cook until the sugar is melted;

iii) gradually pour the mixture obtained from step (i) into the saucepan of step (ii) and stir to mix everything until it reaches a silky-smooth consistency; and

iv) cook until the desired consistency is obtained (a viscosity of about 270 cP).

In a third aspect the invention provides a kit comprising a plant-based vegan simulated kaya composition of the first aspect.

In a fourth aspect the invention provides a plant-based vegan simulated egg white composition, comprising sucrose ester, gum, and water.

In some embodiments of the plant-based vegan simulated egg white composition;

a) the sucrose ester has a hydrophilic-lipophilic balance (HLB) in the range of 9 to 15; and/or

b) the gum is selected from the group comprising xanthan gum, methylcellulose, guar gum, pectin and gum arabic. Preferably the HLB is 11.

In some embodiments, the gum is a combination of xanthan gum and methylcellulose.

In some embodiments of the plant-based vegan simulated egg white composition comprises; sucrose ester in an amount of about 0.5-3 wt%, gum in an amount of about 0.1 to about 0.2 wt%, and water in an amount of about 96.8 to about 99.4 wt%, by weight of said simulated egg white composition.

In some embodiments, the gum comprises xanthan gum in an amount of about 0.05 to about 0.1 wt% and methylcellulose in an amount of about 0.05 to about 0.1 wt%, by weight of said simulated egg white composition.

In some embodiments of the plant-based vegan simulated egg white composition comprises;

xanthan gum in an amount of about 0.05 wt%, methylcellulose in an amount of about 0.05 wt%, sucrose ester in an amount of about 1.5 wt%, and water in an amount of about 98.4 wt%, by weight of said simulated egg white composition.

In a fifth aspect, the invention provides a method of producing a vegan simulated egg white composition of the fourth aspect, comprising the steps:

i) mix sucrose ester and gum together;

ii) slowly add the mixture to water with stirring until all solids are dissolved.

In some embodiments the method further comprises the steps:

iii) add a portion of dissolved composition from step ii) to a suitable cocktail beverage; and

iv) shake or whisk until the desired consistency is obtained.

In some embodiments the portion in iii) is a volume of about 40-50 mL.

In a sixth aspect the invention provides a kit comprising a plant-based vegan simulated egg white composition of the fourth aspect.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 shows the appearance of a vegan simulated kaya of the invention spread on toast and in a jar.

Figure 2 shows the appearance of the vegan simulated egg white of the invention on the top of a cocktail.

DETAILED DESCRIPTION

Definitions

Certain terms employed in the specification, examples and appended claims are collected here for convenience.

It must be noted that as used herein and in the appended claims, the singular forms "a", "an", and "the" include plural reference unless the context clearly dictates otherwise.

As used herein, the term "comprising" or "including" is to be interpreted as specifying the presence of the stated features, integers, steps or components as referred to, but does not preclude the presence or addition of one or more features, integers, steps or components, or groups thereof. However, in context with the present disclosure, the term "comprising" or "including" also includes "consisting of". The variations of the word "comprising", such as "comprise" and "comprises", and "including", such as "include" and "includes", have correspondingly varied meanings.

As used herein, the term “about” is intended to encompass a variance of 10% from a recited numerical value. For example, ‘about 4 wt%’ in relation to a vegan simulated kaya composition or egg white cocktail composition of the invention encompasses a numerical value of 3.6 to 4.4 wt%.

Having now generally described the invention, the same will be more readily understood through reference to the following examples which are provided by way of illustration, and are not intended to be limiting of the present invention.

EXAMPLES

EXAMPLE 1

Plant-based vegan simulated kaya components

Coconut cream

To make this coconut jam, coconut cream is the ingredient that is of most importance. In addition to providing flavor, coconut cream is a source of medium-chain triglycerides (MCT) that lower bad cholesterol and increase good cholesterol. It is also a rich source of B vitamins, vitamin C, vitamin E as well as a source of essential minerals including magnesium and

phosphorus. In some cases, coconut cream may be substituted in the vegan simulated kaya formulation with coconut milk, but it will take longer to cook off the extra moisture.

The optimal amount of coconut cream in the formulation ranges from about 47 to about 48 wt%, preferably from 47-48 wt%, by weight of said vegan kaya composition.

Pandan juice

Pandan juice is added to provide the olive green color and a hint of pandan flavor that is usually perceived in kaya jam. Alternatively, pandan food flavor and green food color can be added to help accentuate the pandan taste and aroma as well as olive green color, respectively.

The optimal amount of pandan juice in the formulation ranges from about 9 to about 10 wt%, preferably from 9-10 wt%, by weight of said vegan kaya composition.

Sweetening agents

A combination of white sugar, brown sugar, and maltitol is added to provide the sweetness and contribute to a slight brown tint and unique caramel taste that comes from the Maillard reactions that occur upon heat treatment. Another sweetening agent that may be used is white sugar.

Maltitol is a sugar alcohol (a polyol) used as a sugar substitute. It has 75–90% of the sweetness of sucrose and nearly identical properties but is not completely digested, boasting significantly less calories than sucrose. Maltitol is made through the hydrogenation of maltose, which is obtained from enzyme conversion of starch to maltose. A low calorie sweetener like maltitol is added to partially replace sugar in light of the global rise of type 2 diabetes mellitus and obesity.

The color and taste of the end result largely depends on the type and/or ratio of sweetening agent used. Therefore, the optimal amount of white sugar in the formulation ranges from about 4 to about 5 wt%, preferably from 4-5 wt%, by weight of said vegan kaya composition. On the other hand, the optimal amount of brown sugar in the formulation ranges from about 4 to about 5 wt%, preferably from 4-5 wt%, by weight of said vegan kaya composition. Meanwhile, the optimal amount of maltitol in the formulation ranges from about 13 to about 19 wt%, preferably from 13-19 wt%, by weight of said vegan kaya composition.

Sucrose ester

Sucrose ester is an emulsifier used to help in the combination of water and lipids. Its ability to prevent phase separation also allows for a smooth and cohesive mixture of the vegan simulated kaya. Sucrose esters are produced by inter-esterification or transesterification of sucrose with the vinyl esters of fatty acids. An example of a sucrose ester is marketed as Habo MX (T110D0111) by Compass Foods Pte Ltd (Singapore).

The optimal amount of sucrose ester in the formulation ranges from about 0.15 to about 0.2 wt%, preferably from 0.15-0.2 wt%, by weight of said vegan kaya composition.

Corn starch

Corn starch (or corn flour) is a type of carbohydrate derived from the endosperm of the corn grain kernels. It is a food ingredient commonly used for the purpose of thickening. The corn starch gel is transparent, is relatively flavourless and is viscous, making it a suitable ingredient substitute for egg yolk. The ingredient comprises of long chains of starch molecules which, when heated in the presence of moisture, will unravel and gelatinize, allowing for the thickening to occur.

The optimal amount of corn starch in the formulation ranges from about 1.4 to about 1.6 wt%, preferably from 1.4-1.6 wt%, by weight of said vegan kaya composition.

Plant protein

Plant protein is used for protein enrichment. Preferably the type of plant protein used in the vegan simulated kaya formulation is soy protein. More preferably a soy protein isolate is used which comprises 90% protein on a dry basis. On top of protein enrichment, soy protein isolate is used to achieve good and stable emulsion and improve the structure of final product in a cost-effective way. An example of a soy protein isolate is marketed as ISOPRO 510A by Shandong Sinoglory Health Food Co., Ltd (China).

To produce an isolate, wet soya meal is subjected to flash desolvation and cooling process. Flash desolventizing refers to the instantaneous desolventing of wet soy meal at high temperature, removing most of the solvents, and then directly stripping the white oil cake in vacuum. After desolventing, the material is cooled and discharged to a lower temperature region, so that the denaturation of protein occurs the lowest.

The optimal amount of plant protein in the formulation ranges from about 1.1 to about 1.5 wt%, preferably from 1.1-1.5 wt%, by weight of said vegan simulated kaya composition.

Plant fiber

Plant fiber is a type of dietary fiber and complex carbohydrate used for fiber enrichment and bulk provided in the vegan simulated kaya of the invention. Preferably the type of plant fiber used is soluble pea fiber. Alternatively, other types of soluble fibers may be used such as oat and psyllium. To produce pea fiber, yellow peas are subjected to wet separation in which internal fibers are extracted.

The optimal amount of plant fiber in the formulation ranges from about 0.35 to about 0.7 wt%, preferably from 0.35-0.17 wt%, by weight of said vegan simulated kaya composition.

Water

Water is added to help solubilize the dry ingredients, sans sweetening agents, prior to the cooking step in which they will be combined with the other wet ingredients. The amount of water added to the composition needs to be sufficient to bring the total wt% to 100.

The optimal amount of water in the formulation ranges from about 9 to about 20 wt%, preferably from 14-15 wt%, by weight of said vegan kaya composition.

Formulation

In some embodiments, the vegan salted egg sauce composition of the invention is formulated as shown in Table 1.

Table 1: Composition of Vegan simulated Kaya

Ingredient	Composition Percentage (wt%)
Coconut cream	47-48
Pandan juice	9-10
White sugar	4-5
Brown sugar	4-5
Maltitol	13-19
Sucrose ester	0.15-0.2
Corn starch	1.4-1.6
Plant protein	1.1-1.5
Pea fiber	0.35-0.7
Water	9-20

In some embodiments, the vegan simulated kaya composition is formulated as shown in Table 2.

Table 2: Composition of Vegan simulated Kaya

Ingredient	Composition Percentage (wt%)
Coconut cream	47.5
Pandan juice	10
White sugar	5

Brown sugar	5
Maltitol	15
Sucrose ester	0.19
Corn starch	1.53
Plant protein	1.28
Pea fiber	0.45
Water	14.05

In some embodiments, the vegan salted egg sauce composition of the invention may be prepared as follows:

Method of Preparation

1. Using a mixer, such as a Silverson Mixer, combine the sucrose ester, corn starch, plant protein, water, and plant fiber until a homogeneous mixture is achieved.
2. Add coconut cream, sweetening agents, and pandan juice into a saucepan over medium heat and cook until the sugar is just melted.
3. Gradually pour the mixture obtained from step (1) into the saucepan of step (2) and stir to mix everything until it reaches a silky-smooth consistency and without lumps.
4. Continue to cook until the desired consistency is obtained (viscosity of about 270cP).

Figure 1 shows vegan simulated kaya of the invention spread over toast.

EXAMPLE 2

Plant-based vegan simulated egg white components

Sucrose ester is an emulsifier, obtained by esterifying sucrose with edible fatty acids from palm oil. This ingredient is used in many applications such as bakery, confectionary, cereals, ice cream, sauces and beverages. Most importantly, sucrose esters is essential in the formulation of vegan “egg” white for cocktail application as it has the unique ability to provide aeration by boosting the functions of other emulsifiers and improve the air bubble structure. This allows for better foam height and stability when used in cocktail mixes. An example of a sucrose ester is marketed as Habo MX (T110D0110) by Compass Foods. The optimal amount of sucrose esters in the vegan “egg” white formulation ranges from about 0.05 – 3.00 wt%, by weight of said vegan “egg” white composition. As sucrose esters have a wide range in their hydrophilic-lipophilic balance (HLB), it is important to note that the higher the

HLB, the lower the recommended dosage, to prevent severe sedimentation or undesired precipitation. For solubility, in general, the higher the HLB value of the ester, the more soluble it is in water, whereas lower HLB esters are more soluble in oil/fat and medium HLB esters are partly soluble in water and partly in oil/fat. Preferably the sucrose ester used in the composition of the invention is soluble in water. Preferably, the sucrose ester has a HLB in the range of 9 to 15. More preferably the HLB is 11.

Gums

Xanthan gum and methylcellulose are used in this "vegan" egg white formulation. Xanthan gum is an exopolysaccharide secreted by the microorganism Xanthomonas campestris. Advantageously, this hydrocolloid exhibits excellent stabilizing effect to provide a structure for air bubbles, which is necessary in the foam head created by the sucrose esters as previously mentioned above. In addition, methylcellulose is necessary in the formulation as it provides a better viscosity and mouthfeel to the overall beverage. Furthermore, it is able to provide additional support to the foam structure, slowing down the overall rate of foam breakage and separation. The optimal amount of each gum mentioned ranges from about 0.05 – 0.10 wt%, preferably from 0.05 – 0.10 wt%, by weight of said vegan "egg: white composition. Other gums such as gum arabic, pectin and guar gum may also be used. However, trials have shown that these gums could also provide good mouthfeel to the final beverage but were not as effective in stabilizing the foam as compared to xanthan gum and methylcellulose.

Water

Water acts as the medium for the activation of both the sucrose esters and the gums. When heating is involved, it allows for full dispersion and hence activates the functionality of the esters. For this formulation, given that the sucrose ester has a HLB value of 11, water is the preferred medium for solubility and activation. Xanthan gum and methylcellulose are also soluble in water. The amount of water added to the composition brings the total wt% of the composition up to 100%.

Formulation

In some embodiments, the vegan simulated egg white composition of the invention is formulated as shown in Table 1.

Table 1: Composition of Vegan simulated egg white

Ingredients	Composition Percentage (wt%)
Water	96.8 – 99.4

Sucrose esters	0.50 – 3.00
Methylcellulose	0.05 – 0.10
Xanthan gum	0.05 – 0.10

In some embodiments, the vegan simulated egg white composition of the invention is formulated as shown in Table 2.

Table 2: Composition of Vegan simulated egg white

Ingredients	**Composition Percentage (wt%)**
Water	98.4
Sucrose esters (Habo MX (T110D0110))	1.50
Methylcellulose	0.05
Xanthan gum	0.05

In some embodiments, the vegan simulated egg white composition of the invention may be prepared as follows:

Method of Preparation

1. Mix all dry ingredients (i.e. sucrose esters, methylcellulose, xanthan gum) together in a dry bowl.
2. Weigh out the water in a separate container.
3. Slowly add all the dry ingredients into the water with continuously stirring until all solids are completely dissolved.

In some embodiments, the egg white composition may be applied to a cocktail beverage as follows:

4. To a cocktail beverage, add about 40-50 mL of liquid from step 3 to replace one raw egg white serving in the beverage.
5. Shake or whisk the combination from step 4 to get the desired foam.

Figure 2 shows a cocktail comprising foamed simulated egg white composition of the invention.

CLAIMS

1. A plant-based vegan simulated kaya composition, comprising;
coconut cream, pandan juice, sweetening agent, sucrose ester, corn starch, plant protein, plant fiber, and water.

2. The plant-based vegan simulated kaya composition of claim 1, wherein;
a) the plant protein is soy protein; and/or
b) the pandan juice is selected from the group comprising pandan juice and pandan food flavor with green food color; and/or
c) the sweetening agent is a combination of white sugar, brown sugar and maltitol; and/or
d) the plant fiber is selected from the group comprising soluble pea fiber, oat and psyllium.

3. The plant-based vegan simulated kaya composition of claim 1 or 2, wherein the plant protein is soy protein isolate.

4. The plant-based vegan simulated kaya composition of any one of claims 1 to 3, comprising;
coconut cream in an amount of about 47-48 wt%, pandan juice in an amount of about 9 to about 10 wt%, sweetening agent in an amount of about 21 to about 29 wt%, sucrose ester in an amount of about 0.15 to about 0.2 wt%, corn starch in an amount of about 1.4 to about 1.6 wt%, plant protein in an amount of about 1.1 to about 1.5 wt%, pea fiber in an amount of about 0.35 to about 0.7 wt% and water in an amount of about 9 to about 20 wt%, by weight of said simulated kaya composition.

5. The plant-based vegan simulated kaya composition of claim 4, wherein the sweetening agent comprises white sugar in an amount of about 4 to about 5 wt%, brown sugar in an amount of about 4 to about 5 wt% and maltitol in an amount of about 13 to about 19 wt%, by weight of said simulated kaya composition.

6. The plant-based vegan simulated kaya composition of claim 5, comprising;
coconut cream in an amount of about 47.5 wt%, pandan juice in an amount of about 10 wt%, white sugar in an amount of about 5 wt%, brown sugar in an amount of about 5 wt% and maltitol in an amount of about 15 wt%, sucrose ester in an amount of about 0.19

wt%, corn starch in an amount of about 1.53 wt%, plant protein in an amount of about 1.28 wt%, pea fiber in an amount of about 0.45 wt% and water in an amount of about 14.05 wt%, by weight of said simulated kaya composition.

7. A method of producing a vegan simulated kaya composition of any one of claims 1 to 6, comprising the steps:

i) in a blender, mix sucrose ester, corn starch, plant protein, water, and plant fiber until a homogeneous mixture is achieved;

ii) add coconut cream, sweetening agents, and pandan juice into a saucepan over medium heat and cook until the sugar is melted;

iii) gradually pour the mixture obtained from step (i) into the saucepan of step (ii) and stir to mix everything until it reaches a silky-smooth consistency; and

iv) cook until the desired consistency is obtained (a viscosity of about 270 cP).

8. A kit comprising a plant-based vegan simulated kaya composition of any one of claims 1 to 6.

9. A plant-based vegan simulated egg white composition, comprising;
sucrose ester, gum, and water.

10. The plant-based vegan simulated egg white composition of claim 9, wherein;

a) the sucrose ester has a hydrophilic-lipophilic balance (HLB) in the range of 9 to 15; and/or

b) the gum is selected from the group comprising xanthan gum, methylcellulose, guar gum, pectin and gum arabic.

11. The plant-based vegan simulated egg white composition of claim 9 or 10, wherein the gum is a combination of xanthan gum and methylcellulose.

12. The plant-based vegan simulated egg white composition of any one of claims 9 to 11, comprising;

sucrose ester in an amount of about 0.5-3 wt%, gum in an amount of about 0.1 to about 0.2 wt%, and water in an amount of about 96.8 to about 99.4 wt%, by weight of said simulated egg white composition.

13. The plant-based vegan simulated egg white composition of claim 12, wherein the gum comprises xanthan gum in an amount of about 0.05 to about 0.1 wt% and methylcellulose in an amount of about 0.05 to about 0.1 wt%, by weight of said simulated egg white composition.

14. The plant-based vegan simulated egg white composition of any one of claims 9 to 13, comprising;

xanthan gum in an amount of about 0.05 wt%, methylcellulose in an amount of about 0.05 wt%, sucrose ester in an amount of about 1.5 wt%, and water in an amount of about 98.4 wt%, by weight of said simulated egg white composition.

15. A method of producing a vegan simulated egg white composition of any one of claims 9 to 14, comprising the steps:

i) mix sucrose ester and gum together;

ii) slowly add the mixture to water with stirring until all solids are dissolved.

16. The method of claim 15, further comprising the steps:

iii) add a portion of dissolved composition from step ii) to a suitable cocktail beverage; and

iv) shake or whisk until the desired consistency is obtained.

17. The method of claim 16, wherein the portion is a volume of about 40-50 mL.

18. A kit comprising a plant-based vegan simulated egg white composition of any one of claims 9 to 14.