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(57) Abstract: The present invention provides compositions that display advantageous optical properties without the need for additive preservatives.



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## COMPOSITION

### Background

5 There has been a push in recent years to reduce the addition of additives and preservatives in foodstuffs. In one aspect, there has been a drive to use natural alternatives. However, unfortunately, natural products are generally not as efficient nor effective as their artificial counterparts and may lead to issues with the sensory properties of the products.

10 Specifically, in respect of this invention, sulphur dioxide is a commonly used additive/preservative for the prevention of enzymatic and non-enzymatic browning in foods, especially fruit and vegetable products.

15 In the field of dried-fruits, sulphur dioxide is almost ubiquitous in commercially available fruit-based snack products.

20 Additionally, despite being routinely recognized as safe, however, sulphur dioxide strongly reduces vitamin B1 uptake. Reduced uptake of this vitamin may potentially lead to several health problems such as chronic headache and impact on memory retention. A special risk group is the group of asthma patients. For these patients an intake of less than 10 mg sulphur dioxide might be enough to provoke an asthma attack. Accordingly, whilst the reduction in sulphur dioxide for the majority of the population is one which would be desirable from a consumer-choice point of view, removal of this preservative may lead the way in making healthier snack products for  
25 a certain section of the population more available.

30 However, the reduction or replacement of sulphur dioxide, as well as many other commonly used additives and/or preservatives, bears the risk of changing the foodstuffs' sensory properties, especially color and taste, as well as mouthfeel. Thus, consumers may refuse such food alternatives, even though these alternative foodstuffs can be considered healthier. A number of commercially available fruit-based snack products do not contain sulphur dioxide but suffer from unappealing visual appearances, specifically very dark appearances, which can lead to consumers mistakenly considering that a product is not fit to be eaten.

35 WO2017062598 discloses a moist mixture of fruit/vegetable base material and hydrocolloids. However, the compositions require the addition of extra ingredients to ensure stability and nutrition.

40 WO2010127912 relates to whole grain cereal based products.

US20060257531 and US20070243300 disclose fruit bars with different textures. However, none of these documents seeks to provide a solution to the issue of providing alternative preservatives.

45 Accordingly, the present invention provides a solution to the above problems.

### Summary of Invention

50 The present invention provides a base composition that includes a component that inhibits polyphenol oxidase activity.

The present invention provides a base composition that includes a component that comprises at least one organic acid.

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The present invention provides a base composition that includes a component that is derived from a fruit and comprises at least one organic acid and does not include an added preservative.

- 5 The present invention provides a product composition that includes the base composition, wherein the product composition is preferably a fruit bar.

10 The present invention provides the use of the component of the present invention to control the optical properties of a base composition and/or a product composition within the meaning of the present invention. The present invention also provides the use of the component of the present to inhibit enzymatic browning.

### Background of Invention

#### 15 **Component**

In an embodiment, the component of the present invention has a composition that inhibits polyphenol oxidase activity.

- 20 In an embodiment, the component comprises at least one organic acid. In a preferred embodiment, the component comprises organic acids selected from the group consisting of citric, malic, shikimic, fumaric, tartaric, isocitric acid, oxalic, ascorbic and quinic and mixtures thereof. In a preferred embodiment, the component comprises organic acids selected from the group consisting of citric, malic, shikimic, ascorbic and fumaric, and mixtures thereof. In a preferred embodiment, the component comprises malic acid.

30 In a preferred embodiment, if a mixture of acids is present, at least 50% by weight of the mixture is malic acid, preferably at least 60%, preferably at least 70%. In an embodiment, if a mixture of acids is present, less than 99.95% by weight of the mixture is malic acid, preferably less than 97.5%. In a preferred embodiment, the component comprises a mixture of acids that comprise between 50% and 97.5% by weight malic acid based on the weight of the acid mixture.

35 In an embodiment, the component has an acid content of 10.0 g/kg, preferably greater than 12.0 g/kg, more preferably greater than 14.0 g/kg, more preferably greater than 16.0 g/kg, more preferably greater than 18.0 g/kg, more preferably greater than 20.0 g/kg, more preferably greater than 22.0 g/kg. In an embodiment, the component has an acid content of less than 100.0 g/kg, less than 50.0 g/kg, less than 40.0 g/kg, less than 35.0 g/kg and less than 30.0 g/kg. In a preferred embodiment, the acid content is between 10.0 g/kg and 100.0 g/kg.

45 In an embodiment, the acid content was determined by reversed-phase HPLC on a Surveyor Thermo Electron system using a Hypersil Gold aQ column (25 cm x 4.6 mm) with a particle size of 5 µm. A 50 mM water solution of KH<sub>2</sub>PO<sub>4</sub> buffer at pH 2.9 was used as the mobile phase. The column temperature was kept at 10.0°C and the flow rate at 0.68 mL/min. Detection of malic and citric acids were by absorbance at 214 nm while detection of ascorbic acid was at 254 nm.

50 In an embodiment, the component has a pH of less than 4.5, preferably less than 4.25, preferably less than 4.0, preferably less than 3.75, more preferably less than 3.5, more preferably less than 3.25, more preferably less than 3.0. In an embodiment, the component has a pH of greater than 1.0, greater than 1.25 or greater than 1.5. In a preferred embodiment, the pH is between 1.0 and 4.5.

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In a preferred embodiment, the component is derived from fruit, preferably from pear, apples, pineapples, blueberries, grapefruits, pomegranates, grapes, blue plums and cranberries and mixtures thereof, most preferably from apple.

- 5 In a preferred embodiment, the component is prepared from the whole fruit (e.g. flesh and skin, rind, optionally seeds, if edible), preferably the component consists essentially of whole fruit.

- 10 In a preferred embodiment, the component of the present invention contains less than 20% by weight of moisture, preferably less than 15% and preferably less than 10%. In an embodiment of the present, the amount of moisture is greater than 0.1% by weight of the component, optionally greater than 0.25%. In a preferred embodiment, the above moisture contents relate to the component prior to it being combined with other components to form the base composition. In a preferred embodiment, the component  
15 has a moisture content of between 0.1% and 20% by weight.

- In a preferred embodiment, the water content above may be measured using Karl Fischer analysis, for example, using Karl Fischer analysis, Orion 2 Turbo with methanol:formamide 2:1.  
20

- In an embodiment, the component is in the form of particles with an average diameter (preferably the longest axis of the particle) between 2.5mm and 20mm, preferably between 5.0mm and 15mm. In an embodiment, this particle size may be measured with a ruler for 10 or more sample pieces, preferably 10, with the longest diameter  
25 assessed by eye.

- In a preferred embodiment, the component is in the form a powder, preferably of particle size, preferably d50, between 0.10 and 1.2mm, preferably between 0.25 and 1.0mm.  
30

- In a preferred embodiment, laser diffraction is used to measure the particle size, d50 using a Malvern Mastersizer 2000, Method Scirocco 2000 dry attachment, Fraunhofer scattering theory.

- 35 In a preferred embodiment, the component is apple powder, preferably whole apple powder, with an acid content greater than 10 g/Kg and less than 50.0 g/kg, preferably in the form of a powder with a particle size of between 0.10 and 1.2mm and a moisture content of between 0.1% and 10% by weight. In a preferred embodiment, the component is dehydrated apple powder available from Frubella, Poland.  
40

- The present invention provides the use of the component of the present invention to control the optical properties of a base composition and/or a product composition within the meaning of the present invention. The present invention also provides the use of the component of the present to inhibit enzymatic browning, preferably in a  
45 fruit/vegetable based composition, more preferably in the base composition and/or product composition of the present invention.

### **Base Composition**

- 50 The present invention provides a base composition that comprises the component of the present invention in combination with at least one other ingredient.

- By "base-composition" is meant a composition that may be used as an intermediate component in the production of further compositions, preferably the product  
55 compositions of the present invention, i.e. the base composition is preferably a

fundamental ingredient or chief constituent of the product compositions of the present invention.

5 In a preferred embodiment, the component of the present invention is present in the base composition in an amount of between 5% and 40% by weight of the base composition, preferably between 10% and 35% by weight and most preferably between 15% and 25%, between 7.5% and 22.5% or between 10% and 20%.

10 In a preferred embodiment, the ingredients derived from fruit and/or vegetables in an amount of between 60% and 95% by weight of the base composition, preferably between 65% and 90% by weight and most preferably between 70% and 90%, between 77.5% and 92.5% or between 80% and 90%.

15 In a preferred embodiment, the base composition of the present invention contains ingredients derived from fruit and/or vegetables, preferably components derived from apple, date, mango, apricot, prune, pear, rhubarb raisins, beetroot and mixtures thereof. In a preferred embodiment, the base composition contains apples and/or dates in addition to the component described above.

20 In a preferred embodiment, the base composition of the present invention is in the form of a paste, preferably the paste forms the matrix phase for the component of the invention to be dispersed in. In a preferred embodiment, the base composition comprises a moisture content of between 5 wt% and 35 wt%, preferably 10 wt% and 30 wt%.

25 In a preferred embodiment, the moisture content may be calculated using oven drying, preferably 5g of sample in a 102°C fan oven for 3 hours. Measure mass before and after and the percentage weight loss is moisture.

30 In an embodiment, other ingredients may be dispersed in the base composition of the present invention in addition to the component of the present invention. For example, other fruit/vegetable-based powders.

35 In a preferred embodiment, the component is a powder that is dispersed in an apple and/or date paste. In a preferred embodiment, the ratio of apple to date paste is between 10:1 and 5:1 by weight, preferably between 8:1 and 6:1.

40 In a preferred embodiment, the base compositions substantially consist of the component and an apple and/or date paste. In a preferred embodiment, the apple paste is available from Taura Natural Ingredients, New Zealand.

45 The base compositions of the present invention display beneficial optical properties even in respect of the absence of a traditionally used additive preservative. Optical properties may be assessed using L, Chroma and/or Hue values. These values were defined by the Commission Internationale de l'Eclairage (CIE). In a preferred embodiment, these values are as high as possible which evidences a lack of enzymatic browning.

50 In an embodiment, the above values are obtained using a Verivide DigiEye with a D7000 Nikon Corporation, Japan (16.2 megapixel) camera and an illumination box and preferably using software version 2.7.4.0. The samples are preferably measured against a grey surround (L=50) and white background. In a preferred embodiment, the relationship between Chroma and Hue values is given by using colour parameters a (red/green) and b (yellow/blue):

55  $C = \sqrt{a^2 + b^2}, h = \arctan(b/a)$

In an embodiment, the base composition has an L value between 35 and 55, preferably between 37 and 52.

- 5 In an embodiment, the base composition has a Chroma value between 22.5 and 37.5, preferably between 24 and 35.

In an embodiment, the base composition has a Hue value between 45 and 65, preferably between 47.5 and 62.5.

10

In an embodiment, the base composition has an L value between 35 and 55, a Chroma value between 22.5 and 37.5 and/or (preferably and) a Hue value between 45 and 65.

- 15 Accordingly, the present invention provides compositions with advantageous optical properties without the need for additional preservatives.

### **Product Composition**

- 20 In a preferred embodiment, the base composition is used in a product composition in an amount of between 50% and 95% by weight of the product composition, preferably in an amount of between 50% and 85% by weight of the product composition, preferably between 55% and 80%. The other ingredients discussed below contribute to the final weight of the product composition.

- 25 In a preferred embodiment, the base compositions form the continuous phase in which the other ingredients may be distributed in the product composition.

- 30 In an embodiment, the product composition contains other ingredients selected from the group comprising fruits, vegetables, fats (e.g. oils), nuts, pulses, cereals and grains, herbs, spices, salts, chocolate (and chocolate-based products), cocoa mass, yogurt, sugar, sugar-syrups, sweeteners (artificial and natural) and honey. The fruits and/or vegetables mentioned above may be in the form of slices (optionally dehydrated), chunks/pieces optionally dehydrated) and/or powdered.

- 35 The product composition of the present invention is a foodstuff. In a preferred embodiment of the present invention, the product composition of the present invention is selected from the group consisting of a fruit bar, a fruit and nut bar, a fruit and cereal bar, a fruit and vegetable bar, an energy bar, an inclusion for use in a composite foodstuff, preferably a snack food, preferably a biscuit composition, a filling or coating  
40 composition (preferably for a confectionery composition, preferably for a snack food, preferably for a biscuit).

- 45 In a preferred embodiment, the product is a pressed fruit bar, preferably cold-pressed, after the ingredients have been combined.

In a preferred embodiment, the product is not-baked.

- 50 In a preferred embodiment, the product composition of the present invention comprises: 50-75% by weight fruit paste (preferably apple and/or date) and 5-20% by weight fruit/vegetable powder (preferably apple, beetroot, and/or lemon).

- 55 In a preferred embodiment, the product composition of the present invention comprises: 50-75% by weight fruit paste (preferably apple and/or date), 5-20% by weight fruit/vegetable powder (preferably apple, beetroot, and/or lemon) and 2.5-15% by weight nut/pulse/grain.

In a preferred embodiment of the above embodiments, the powder comprises the component of the present invention.

- 5 A product within the scope of the present invention has similarly advantageous optical properties to the base composition of the present invention.

In an embodiment, the product composition has an L value between 35 and 55, preferably between 37 and 52.

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In an embodiment, the product composition has a Chroma value between 22.5 and 37.5, preferably between 24 and 35.

15

In an embodiment, the product composition has a Hue value between 45 and 65, preferably between 47.5 and 62.5.

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In an embodiment, the product composition has an L value between 35 and 55, a Chroma value between 22.5 and 37.5 and/or (preferably and) a Hue value between 45 and 65.

In an embodiment, when the product composition comprises beetroot or a similarly dark material, the product displays optical characteristics with lower L, Chroma and Hue values than those recited above.

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In this embodiment, the product composition has an L value between 27 and 37, preferably between 30 and 35.

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In an embodiment, the product has a Chroma value between 12.5 and 22.5, preferably between 15 and 20.

In an embodiment, the product has a Hue value between 10 and 20, preferably between 13 and 18.

35

In an embodiment, the product has an L value between 27 and 37, a Chroma value between 10 and 20 and/or (preferably and) a Hue value between 13 and 18.

40

In a preferred embodiment, the product of the present invention comprises a moisture content of less than 25wt%, preferably less than 20wt%, and preferably less than 17.5wt%. For example, between 1wt% and 25wt%, between 5wt% and 20wt%, or between 10wt% and 17.5wt%.

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In a preferred embodiment, the moisture content may be calculated using oven drying, preferably 5g of sample in a 102°C fan oven for 3 hours. Measure mass before and after and the percentage weight loss is moisture.

Accordingly, the present invention, provides compositions with advantageous optical properties without the need for additional preservatives.

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The base composition of the present invention may be prepared by a simple combination of the component and the other ingredients.

### **Preservative**

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As mentioned above, the present invention seeks to remove the need for additive preservatives in foodstuffs. Preferably, the term "preservative" is a substance capable

of retarding or arresting the deterioration of food, as defined in the Oxford Dictionary of Food & Nutrition, Second Edition, 2005, preferably a “preservatives” are substances which prolong the shelf-life of foods by protecting them against deterioration caused by micro-organisms and/or which protect against growth of pathogenic micro-organisms (EU regulation 1333/2008 Annex 1).

In a preferred embodiment, no significant amount of additional preservative is added to any component of the present invention, i.e. there is no additive that may be considered a preservative. In an embodiment, the component, the base composition and the product composition each independently comprise a preservative between 0.0wt% and 1.0wt%, preferably between 0.0wt% and 0.25wt%, preferably between 0.00wt% and 0.004wt%, and most preferably 0.0wt%, more preferably 0.00wt% or 0.000wt%.

In a preferred embodiment, the component, the base composition and the product composition each independently contain less than 100 ppm, preferably less than 50 ppm, preferably less than 25 ppm, and most preferably 0 ppm of an additive preservative.

Examples of such additives include, sorbates (e.g. potassium or calcium), sorbic acid, benzoates (e.g. sodium, potassium or calcium), methyl/ethyl-p-hydroxybenzoate (e.g. sodium), sulphites (e.g. sodium, sodium hydrogen, sodium meta bi-, potassium, calcium, calcium hydrogen, potassium hydrogen) and sulphur oxides (e.g. sulphur dioxide) and combinations thereof and preferably none of these preservatives is present.

In a preferred embodiment of the present invention, the component of the present invention does not comprise a sulphite or any component that substantially consists of sulphur and oxygen atoms, preferably sulphur dioxide.

In a preferred embodiment of the present invention the base composition does not comprise a sulphite or any component that substantially consists of sulphur and oxygen atoms, preferably sulphur dioxide.

In a preferred embodiment, the product composition does not comprise a sulphite or any component that substantially consists of sulphur and oxygen atoms, preferably sulphur dioxide.

In a preferred embodiment, when present, the component, the base composition and the product composition do not comprise a sulphite or any component that substantially consists of sulphur and oxygen atoms, preferably sulphur dioxide.

In the above embodiments, independently each of the component, the base composition and/or the product composition comprise less than 1.0wt% of, respectively, each of the component, the base composition and the product composition of a sulphite or any component that substantially consists of sulphur and oxygen atoms, preferably sulphur dioxide, preferably less than 0.5wt%, more preferably less than 0.25wt%, less than 0.15wt%, more preferably less than 0.05wt% and most preferably 0.0wt%, 0.00wt% or 0.000wt%.

In a preferred embodiment, the component of the present invention comprises less than 0.05wt% of sulphur dioxide. In a preferred embodiment, the base composition of the present invention comprises less than 0.05wt% of sulphur dioxide. In a preferred embodiment, the product composition of the present invention comprises less than 0.05wt% of sulphur dioxide. In a highly preferred embodiment, each of the component,

the base composition and the product composition contain 0.0wt%,0.00wt% or 0.000wt% sulphur dioxide.

#### Definitions

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Unless the context clearly indicates otherwise, as used herein plural forms of the terms herein are to be construed as including the singular form and vice versa.

10

Preferred utility of the present invention comprises use as a foodstuff, preferably as a confectionery product and/or intermediate in the manufacture thereof.

Unless the context clearly indicates otherwise, as used herein plural forms of the terms herein are to be construed as including the singular form and vice versa.

15

The term "comprising" as used herein will be understood to mean that the list following is non exhaustive and may or may not include any other additional suitable items, for example one or more further feature(s), component(s), ingredient(s) and/or substituent(s) as appropriate.

20

In the discussion of the invention herein, unless stated to the contrary, the disclosure of alternative values for the upper and lower limit of the permitted range of a parameter coupled with an indicated that one of said values is more preferred than the other, is to be construed as an implied statement that each intermediate value of said parameter, lying between the more preferred and less preferred of said alternatives is itself preferred to said less preferred value and also to each less preferred value and said intermediate value.

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30

For all upper and/or lower boundaries of any parameters given herein, the boundary value is included in the value for each parameter. It will also be understood that all combinations of preferred and/or intermediate minimum and maximum boundary values of the parameters described herein in various embodiments of the invention may also be used to define alternative ranges for each parameter for various other embodiments and/or preferences of the invention whether or not the combination of such values has been specifically disclosed herein.

35

Unless noted otherwise, all percentages herein refer to weight percent, where applicable.

40

It will be understood that the total sum of any quantities expressed herein as percentages cannot (allowing for rounding errors) exceed 100%. For example the sum of all components of which the composition of the invention (or part(s) thereof) comprises may, when expressed as a weight (or other) percentage of the composition (or the same part(s) thereof), total 100% allowing for rounding errors. However where a list of components is non exhaustive the sum of the percentage for each of such components may be less than 100% to allow a certain percentage for additional amount(s) of any additional component(s) that may not be explicitly described herein.

45

50

The term "substantially" as used herein may refer to a quantity or entity to imply a large amount or proportion thereof. Where it is relevant in the context in which it is used "substantially" can be understood to mean quantitatively (in relation to whatever quantity or entity to which it refers in the context of the description) there comprises an proportion of at least 80%, preferably at least 85%, more preferably at least 90%, most preferably at least 95%, especially at least 98%, for example about 100% of the relevant whole. By analogy the term "substantially-free" may similarly denote that

55

quantity or entity to which it refers comprises no more than 20%, preferably no more

than 15%, more preferably no more than 10%, most preferably no more than 5%, especially no more than 2%, for example about 0% of the relevant whole. Preferably where appropriate (for example in amounts of ingredient) such percentages are by weight.

5

Any weight percentages in parameters above are calculated with respect to initial weight of the component.

10

Unless otherwise indicated or the context clearly indicates otherwise all the tests herein are carried out under standard conditions as also defined herein.

15

As used herein, unless the context indicates otherwise, standard conditions means, atmospheric pressure, a relative humidity of 50%  $\pm$ 5%, ambient temperature (22°C  $\pm$ 2°) and an air flow of less than or equal to 0.1m/s. Unless otherwise indicated all the tests herein are carried out under standard conditions as defined herein.

20

It should be noted that embodiments and features described in the context of one of the aspects or embodiments of the present invention also apply to the other aspects of the invention. Although embodiments have been disclosed in the description with reference to specific examples, it will be recognized that the invention is not limited to those embodiments. Various modifications may become apparent to those of ordinary skill in the art and may be acquired from practice of the invention and such variations are contemplated within the broad scope of the present invention. It will be understood that the materials used and the chemical details may be slightly different or modified from the descriptions without departing from the methods and compositions disclosed and taught by the present invention.

25

Further aspects of the invention and preferred features thereof are given in the claims herein.

30

The present invention will now be described in detail with reference to the following non limiting examples which are by way of illustration only.

#### Examples 1 to 4

35

The following compositions were prepared according to the present invention:

Example	Apple Powder (Frubella)/ wt%	Apple Paste (Taura)/ wt%	Date paste / wt%
1	10	90	
2	20	70	10
3	20	80	
4	30	70	

40

The compositions were prepared using kitchen-scale mixing equipment and by hand by mixing the ingredients.

#### Comparative Example 1

45

A commercially available product with the following composition was tested relative to the compositions of the present invention.

Comparative Example 1 contained 36.5% apple, 36.5% pear, raisins, flax seeds, rice flour and sulphites.

5 The samples were then tested using a Verivide DigiEye with a D7000 Nikon Corporation, Japan (16.2 megapixel) camera and an illumination box and using software version 2.7.4.0. The samples were measured against a grey surround (L=50) and white background to give L, Chroma and Hue values, which are based on an average of 10 readings.

Example	L	L Standard Deviation	Chroma	Hue
1	39.58	0.46	25.08	50.88
2	41.6	0.65	26.79	54.75
3	46.25	0.79	31.73	58.12
4	50.31	0.70	33.87	60.3
Comparative Example 1	51.6	1.65	36.72	60.17

10 L values relate to lightness. Chroma values represent the degree of difference of a hue in comparison with a grey colour of the same lightness (i.e. quantitative colourfulness). Hue values relate to the difference of a colour to grey colour of the same lightness (i.e. qualitative attribute of colour). The values were obtained using a Verivide DigiEye with a D7000 Nikon Corporation, Japan (16.2 megapixel) camera and an illumination box and using software version 2.7.4.0. The samples were measured against a grey surround (L=50) and white background.

15 As can be seen, the compositions of the present invention do not suffer from enzymatic browning despite the absence of a preservative. The comparable optic properties of Examples 1 to 4 with Comparative Example 1, which contains sulphites, shows that the present invention solves the problem of removing preservatives without any loss in visual appearance.

20 Base compositions within the scope of the present invention were also not observed in displaying enzymatic browning over a period of 2 months.

25 Example 5 and Comparative Example 2

30 A composition within the scope of the present invention (base composition: 8% apple powder, 3% beetroot powder, 51% apple paste and 9% date paste (all wt% relative to product composition, remainder of product composition 8% apple slices, 14% almond and 4% beet root slices and 3% sunflower oil) was compared to a commercially available comparable product that contained: date paste, beetroot, cashew and sunflower seeds. The two compositions were assessed as above.

35 Comparative Example 2 displayed the following optical properties L (27.81±0.68), Chroma (9.49) and Hue (9.07).

40 Example 5 displayed the following optical properties L (31.94±0.67), Chroma (17.28) and Hue (15.00).

Accordingly, the present invention displays improved optical properties over a comparative product when neither contain an additional preservative.

45 Product compositions within the scope of the present invention were also not observed in displaying enzymatic browning over a period of 2 months.

5g of a product sample were put in a 102°C fan oven for 3 hours. The measured mass before and after was looked at for percentage weight loss, which was 13wt%.

Example 6

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Example 5 was stored for 9 months under 20°C, 65% relative humidity fully transparent plastic packaging. There was no change in appearance or flavour. Hence, the use of the component of the present invention provides the necessary retention of optical and flavour properties without the need for further preservatives.

10

Clauses

Preferred embodiments of the invention are set out in the following numbered clauses:

- 5 1. A base composition comprising a component that inhibits polyphenol oxidase activity, and ingredients derived from fruit and/or vegetables.
2. A base composition comprising a component that has an acid content of greater than 10.0 g/kg and ingredients derived from fruit and/or vegetables.
- 10 3. The base composition of either of clauses 1 and 2, wherein the component comprises at least one organic acid selected from the group consisting of citric, malic, shikimic, fumaric, tartaric, isocitric acid, oxalic, ascorbic and quinic and mixtures thereof.
- 15 4. The base composition of clause 3, wherein the component comprises organic acids selected from the group consisting of citric, malic, shikimic, ascorbic and fumaric, and mixtures thereof.
- 20 5. The base composition of clause 3 or clause 4, wherein a mixture of acids is present and at least 50% by weight of the mixture is malic acid and less than 99.95% by weight is malic acid.
- 25 6. The base composition of any of clauses 1 to 5, wherein the component is a whole fruit component.
7. The base composition of any of clauses 1 to 6, wherein the component comprises apple, preferably consists of apple.
- 30 8. The base composition of any of clauses 1 to 7, wherein the component is present in the base composition in an amount of between 5% and 40%, preferably wherein the base composition consists substantially of the component and ingredients derived from fruit and/or vegetables.
- 35 9. The base composition of any of clauses 1 to 8, wherein the ingredients derived from fruit and/or vegetables are selected from ingredients prepared from apple, date, mango, apricot, prune, pear, rhubarb raisins and mixtures thereof, preferably apple and/or date, preferably in the form of a paste.
- 40 10. The base composition of any of clauses 1 to 9, wherein the base composition has an L value between 35 and 55, a Chroma value between 22.5 and 37.5 and/or (preferably and) a Hue value between 45 and 65.
- 45 11. The base composition of any of clauses 1 to 10, wherein the base composition comprises between 5% and 40% of an apple powder, preferably whole apple powder, with an acid content between 10 g/kg and less than 50.0 g/kg and the remainder of the base composition comprises apple and/or date paste.
- 50 12. A product composition that comprises the base composition of any of clauses 1 to 11 in an amount of between 50% and 95% by weight of the product composition.
13. The product composition of clause 12, wherein the product composition is selected from the group consisting of a fruit bar, a fruit and nut bar, a fruit and cereal bar, an energy bar, an inclusion for use in a composite foodstuff, preferably a biscuit

composition, a filling or coating composition (preferably for a confectionery composition, preferably for a biscuit).

5 14. The base composition of any of clauses 1 to 11 and the product composition of any of clauses 12 and 13, wherein no preservative is present in the product composition or the base composition.

10 15. The base composition or product composition of clause 14, wherein the preservative is selected from the group consisting of sorbates (e.g. potassium- or calcium-), sorbic acid, benzoates (e.g. sodium-, potassium or calcium-), methyl/ethyl-p-hydroxybenzoate (e.g. sodium-), sulphites (e.g. sodium-, sodium hydrogen-, sodium meta bi-, potassium-, calcium-, calcium hydrogen-, potassium hydrogen-) and sulphur oxides (e.g. sulphur dioxide) and combinations thereof and preferably none of these preservatives is present.

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CLAIMS

1. A base composition comprising a component that inhibits polyphenol oxidase activity, and ingredients derived from fruit and/or vegetables or a base composition  
5 comprising a component that has an acid content of greater than 10.0 g/kg and ingredients derived from fruit and/or vegetables, wherein the component is present in the base composition in an amount of between 5% and 40% by weight of the base composition.
- 10 2. The base composition of claim 1, wherein the component comprises at least one organic acid selected from the group consisting of citric, malic, shikimic, fumaric, tartaric, isocitric acid, oxalic, ascorbic and quinic and mixtures thereof.
- 15 3. The base composition of claim 2, wherein the component comprises organic acids selected from the group consisting of citric, malic, shikimic, ascorbic and fumaric, and mixtures thereof.
- 20 4. The base composition of claim 2 or claim 3, wherein a mixture of acids is present and at least 50% by weight of the mixture is malic acid and less than 99.95% by weight is malic acid.
5. The base composition of any of claims 1 to 4, wherein the component is a whole fruit component.
- 25 6. The base composition of any of claims 1 to 5, wherein the component is in the form a powder.
7. The base composition of any of claims 1 to 6, wherein the component contains less than 20% by weight of moisture.
- 30 8. The base composition of any of claims 1 to 7, wherein the component comprises apple, preferably consists of apple.
- 35 9. The base composition of any of claims 1 to 8, wherein the base composition consists substantially of the component and ingredients derived from fruit and/or vegetables.
- 40 10. The base composition of any of claims 1 to 9, wherein the ingredients derived from fruit and/or vegetables are selected from ingredients prepared from apple, date, mango, apricot, prune, pear, rhubarb raisins and mixtures thereof, preferably apple and/or date, preferably in the form of a paste.
- 45 11. The base composition of any of claims 1 to 10, wherein the base composition has an L value between 35 and 55, a Chroma value between 22.5 and 37.5 and/or (preferably and) a Hue value between 45 and 65.
- 50 12. The base composition of any of claims 1 to 11, wherein the base composition comprises between 5% and 40% of an apple powder, preferably whole apple powder, with an acid content between 10 g/kg and less than 50.0 g/kg and the remainder of the base composition comprises apple and/or date paste.
- 55 13. A product composition that comprises the base composition of any of claims 1 to 12 in an amount of between 50% and 95% by weight of the product composition, wherein preferably the product composition is selected from the group consisting of a fruit bar, a fruit and nut bar, a fruit and cereal bar, an energy bar, an inclusion for use

in a composite foodstuff, preferably a biscuit composition, a filling or coating composition (preferably for a confectionery composition, preferably for a biscuit).

5 14. The base composition of any of claims 1 to 12 and the product composition of claim 11, wherein no preservative is present in the product composition or the base composition.

10 15. The product composition of claim 14, wherein the preservative is selected from the group consisting of sorbates (e.g. potassium- or calcium-), sorbic acid, benzoates (e.g. sodium-, potassium or calcium-), methyl/ethyl-p-hydroxybenzoate (e.g. sodium-), sulphites (e.g. sodium-, sodium hydrogen-, sodium meta bi-, potassium-, calcium-, calcium hydrogen-, potassium hydrogen-) and sulphur oxides (e.g. sulphur dioxide) and combinations thereof and preferably none of these preservatives is present.

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INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2019/063365

A. CLASSIFICATION OF SUBJECT MATTER  
INV. A23G1/48 A23L7/126 A23L19/00  
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
A23G A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data, FSTA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2017/062598 A1 (WRIGLEY W M JUN CO [US]) 13 April 2017 (2017-04-13) paragraphs [0054] - [0062], [0073] - [0076]; claims; examples -----	1-15
X	WO 2010/127912 A1 (PLANTERIET APS [DK]; BAGGER CHRISTIAN LORENTZ [DK]) 11 November 2010 (2010-11-11) page 30, line 8; claims; examples page 41, lines 5-26 -----	1-15
X	US 2007/243300 A1 (PEYRAT DANIEL [FR]) 18 October 2007 (2007-10-18) paragraphs [0029], [0030]; claims; figures -----	1-15
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Further documents are listed in the continuation of Box C.  See patent family annex.

\* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search  27 June 2019	Date of mailing of the international search report  05/07/2019
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  Bondar, Daniela
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## INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2019/063365

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/257531 A1 (YANG GUOSHEN [US] ET AL) 16 November 2006 (2006-11-16) paragraphs [0013] - [0039]; claims; figures; examples -----	1-15

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