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(54) Title: SOLID AGAVE SYRUP COMPOSITIONS

(57) Abstract: The present invention relates to a agave syrup product having a low water content. The agave syrup product retains the physical and palatable properties of untreated agave syrup while having a prolonged shelf-life. It can be advantageously used to sweeten beverages (such as hot beverages) and in the manufacture of pharmaceutical compositions (such as throat lozenges) and/or confectionary.



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SOLID AGAVE SYRUP COMPOSITIONS

CROSS-REFERENCE TO RELATED APPLICATION

This application claims priority from U.S. provisional patent application Serial No. 61/671,159 filed on July 13, 2012 and incorporated herewith in its entirety.

5 FIELD OF THE INVENTION

This invention relates to solid agave syrup products having a low water content. The organoleptic and physical characteristics of the agave syrup product are very similar to those of the original liquid agave syrup. In addition, the sugars in the agave syrup product are not crystallized.

10 BACKGROUND

Agave syrup (also called agave nectar) is a sweetener which can be obtained from several species of agave, including the blue agave (*Agave tequilana*), salmiana agave (*agave salmiana*), green agave, grey agave, thorny agave and rainbow agave. Agave syrup is sweeter than honey, though less viscous.

- 15 To produce agave syrup from the *Agave tequilana* plant, juice is expressed from the core of the agave, called the *piña*. The juice is filtered, then heated to hydrolyze polysaccharides into simple sugars. The main polysaccharide of the agave juice is called inulin or fructosan and comprises mostly fructose units. The agave juice also contains glucose. The filtered, hydrolyzed juice is concentrated to a syrupy liquid, slightly thinner than honey, from light- to dark-amber
20 depending on the degree of processing.

Agave salmiana is processed differently than *Agave tequilana*. As the plant gestates, it starts to grow a stalk called a *quiote*. The stalk is cut off before it fully grows, creating a hole in the center of the plant that fills with a liquid called *aguamiel*. The liquid is collected daily and the fructans hydrolysed by enzymes into fructose and dextrose.

- 25 Alternative methods used to process the agave juice without heat, include, but are not limited to acid hydrolysis, enzymatic treatment (for example with enzymes derived from *Aspergillus niger*) as well as filtration (such as ultrafiltration).

- An inulin syrup, which may be obtained from agave plants, can be processed into fructose syrup for use in foods and beverages. The conventional techniques for producing fructose syrup from
30 agave plants produce syrups of differing quality, depending on the particular technique. High quality fructose syrup is clear in color and substantially free of the taste and aroma of the agave plant. A poor quality fructose syrup has a yellow-brownish color and is tainted by the taste and smell of the agave plant.

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Agave syrups consists primarily of fructose and glucose. Depending on the source, the fructose content can vary between 56% and 92% whereas the glucose content can vary between 8% and 20%. One of agave syrup's principal advantage is that its glycemic index and glycemic load are comparable to fructose, which in turn has a much lower glycemic index and glycemic load than sucrose. Further, agave syrup is 1.4 to 1.6 times sweeter than sucrose. Agave syrup is often substituted for sugar or honey in recipes. Agave syrup dissolves quickly, it can be advantageously used as a sweetener for cold beverages.

Since the applications and shelf-life of liquid agave are limited, it would be highly desirable to be provided with an agave syrup processed into a solid form and therefore having a low water content. It is preferred that the agave syrup product possesses the distinctive taste and color of the original liquid agave syrup. Preferably, the agave syrup product would not contain any additive(s). It would nevertheless be preferably a very versatile product that could be processed into various food, nutraceutical, dietary supplement or natural health product applications.

SUMMARY

The present invention relates to an agave syrup product having a low water content. In an embodiment, the agave syrup product is a pure dehydrated solid agave syrup product.

According to a first embodiment, the present invention provides a solid agave syrup product consisting essentially of agave syrup and having a moisture content equal to or less than about 0.05% (w/w). As used herein, the term "consisting essentially of" indicates that the agave syrup product is composed of agave syrup and its usual constituents (refer to the definition of agave syrup below) and that no further additives are required to generate the dehydrated product or to store it. The present invention also provides an agave syrup product consisting of agave syrup and having a moisture content equal to or less than about 0.5% (w/w), about 0.4%, about 0.3%, about 0.2%, about 0.1%, about 0.09%, about 0.08%, about 0.07%, about 0.06%, about 0.05%, about 0.04%, about 0.03%, about 0.02% or about 0.01%. In a further embodiment, the moisture content of the agave syrup product is equal to but not higher than about 0.5% (w/w), than about 0.4%, than about 0.3%, than about 0.2%, than about 0.1%, than about 0.09%, than about 0.08%, than about 0.07%, than about 0.06%, than about 0.05%, than about 0.04%, than about 0.03%, than about 0.02% or than about 0.01%. In some embodiment, the solid agave product can be obtained by submitting the agave syrup to a raise in temperature (from room temperature to 90°C for example) as well to a partial vacuum (for example 28 inches of Hg) for a certain period of time (70 minutes for example). In additional embodiments, the sugars of the solid agave products are not crystallized (e.g. they are in an uncrystallized form). In a further embodiment, the solid agave product is translucent and its color is similar to the color of the untreated agave syrup. In further embodiment, the solid agave product can be further processed

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once it has set into a solid (cut, crushed or powdered for example). In yet another embodiment, the solid agave product can be used as a sweetener. In still another embodiment, the agave syrup product or the processed agave syrup can be wrapped in a water-impermeable package. In this particular embodiment, the agave syrup product, when placed into a water impermeable
5 packaging, can have a storage time of three years (or more) without substantially reabsorbing water.

According to a second embodiment, the present invention also provides an agave composition comprising the solid agave product described herein and at least one additive. In an embodiment, the additive is incorporated to an agave syrup which already has been dehydrated
10 and is not included in the agave syrup prior to dehydration. Various additives can be added to the agave syrup product but they should not materially affect the characteristics of the product (such as its moisture content). In some embodiments, the additive can be a flavor, such as, for example, a spearmint, a eucalyptus, a menthol and/or a lemon flavor. In other embodiment, the at least one additive is a preservative (such as, for example, a sugar alcohol). In another
15 embodiment, the agave composition can be a confectionary. In a further embodiment, the agave composition can be a pharmaceutical composition (such as, for example a throat lozenge).

DETAILED DESCRIPTION OF VARIOUS EMBODIMENTS

In accordance with the present invention, there is provided a solid agave syrup product having a moisture content equal to or less than 0.05%. The agave syrup product described herein
20 consists essentially of a liquid agave syrup to which water has been removed. It is pure agave syrup product to which no additive has been added during the dehydration process. The agave syrup product is not limited to any specific manufacturing technique. However, since the agave syrup product retains the color, characteristics and the taste of untreated agave syrup, care must be taken in selecting an appropriate manufacturing technique that will preserve the original
25 agave syrup color, characteristics and taste.

The present invention provides a solid agave syrup product consisting essentially of agave syrup. In a further embodiment, the agave syrup product consists of agave syrup. As used herein, the term "agave syrup" is referred to as a processed juice obtained from the *agave* sp. plant (e.g. also referred to as processed sap or processed *aguamiel*). Such processing can be,
30 for example, a heat treatment, a pH treatment (such as an acid treatment), an enzymatic treatment and/or a fermentation. Such process may be useful in breaking down the polysaccharides (e.g. inulin) in the agave juice, remove impurities, etc. The chemical composition of agave syrup varies depending on syrup source, season and production methods. Storage conditions may also influence final composition, with the proportion of disaccharides
35 increasing over time. Processed agave syrup contains both fructose and glucose, however, it is

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usually considered that the proportion of fructose is higher than the proportion of glucose. Processed agave syrup also contains lesser amounts of inulin, other disaccharides and oligosaccharides (such as mannitol). In an embodiment, the agave syrup comprises between 50% and 90% of fructose, between 5% to 45% glucose and the remaining constituents including inulin. The moisture content of agave syrup is usually at least 20% and usually no more than 30%.

In the context of the present invention, the term "agave syrup" excludes the sap obtained from the agave plant. Further, in some embodiments, besides the enzymatic break down of inulin, an appropriate source processed agave syrup has not been enriched by or depleted from a specific species of polysaccharide, especially compositions enriched in inulin. For example, inulin-enriched liquid compositions (such as inulin syrup for example) from agave sap and/or syrup are not considered to an appropriate source agave syrup.

The liquid agave syrup that can be used in the products and compositions described herein can be semi-processed (such as strained or filtered agave syrup) or fully processed (e.g. heat-and/or acid-treated). The agave syrup product can be made with liquid agave syrup originating from any agave source. Known agave sources include, but are not limited to, *Agave americana*, *Agave angustifolia*, *Agave tequilana*, and *Agave attenuata*. The liquid agave syrup used to manufacture the agave syrup product can be derived from a single *Agave* sp. source or from a combination of *agave* sp. sources depending on the desired properties of the final product.

Once the processed agave syrup has been provided, it is further processed in order to reduce its moisture content to at least about 0.5% and provide an agave syrup in a solid dehydrated form. As used herein "solid agave syrup product" refers to a substance derived from agave syrup that is not liquid and that can be used as a source of nourishment. The agave syrup product can be easily handled (e.g. deposited in a mold) because it is not tacky or soft. In some embodiment, the agave syrup product is hyaline. In another embodiment, the agave syrup product is not initially processed as powder. As it will be shown below in the Example section, a dehydrated agave syrup product containing more than 0.5% w/w of water (and in embodiments, more than about 0.05% w/w of water) does not settle in a solid form once it has been cooled at room temperature. As such, because the agave syrup product described herein has a moisture content lower than about 0.5% w/w (and in embodiments, no more than about 0.5%), it is not tacky or sticky and can be easily be handled without substantially transferring to the surface manipulating the product (such as the skin or the package).

In yet another embodiment, the agave syrup product described herein is a pure and/or dried agave syrup product. As used herein, the term "pure" agave syrup product refers to a product that is free or substantially free from exogenous additives (such as for example exogenous

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polysaccharide (polyol, sucrose, stevia or high-fructose corn syrup)) with respect to the original liquid agave syrup. On the other hand, a "dried" or "dehydrated" agave syrup product refers to the fact that the moisture content is limited to no more than about 0.5% w/w, about 0.4% w/w, about 0.3% w/w, about 0.2% w/w, about 0.1% w/w, about 0.09% w/w, about 0.08% w/w, about 0.07% w/w, about 0.06% w/w, about 0.05% w/w, about 0.04% w/w, about 0.03% w/w, about 0.02% w/w or about 0.01% w/w.

The person skilled in the art can easily assess the percentage of moisture in a agave syrup product using methods readily known in the art. The moisture content of a food product is usually defined through the following formula:

$$\% \text{ moisture} = (m_w/m_{\text{sample}}) \times 100$$

In this formula, m_w is the mass of the water and m_{sample} is the mass of the sample. The mass of water is related to the number of water molecules (n_w) by the following expression:

$$M_w = n_w M_w / N_A,$$

In this formula, M_w is the molecular weight of water (18.0 g per mole) and N_A is Avodagro's number (6.02×10^{23} molecules per mole). In principle, the moisture content of a agave syrup product can therefore be determined accurately by measuring the number or mass of water molecules present in a known mass of sample. When determining the moisture content of a food it is important to prevent any loss or gain of water. For this reason, exposure of a sample to the normal atmosphere, ambient temperature and excessive temperature fluctuations, should be minimized.

In one embodiment, a spectroscopic method can be used to determine the moisture content of the agave syrup product. Spectroscopic methods utilize the interaction of electromagnetic radiation with materials to obtain information about their composition, e.g., X-rays, UV-visible, NMR, microwaves and infra-red (IR). The spectroscopic methods developed to measure the moisture content of foods are based on the fact that water absorbs electromagnetic radiation at characteristic wavelengths that are different from the other components in the food matrix. Microwave and infrared radiation are absorbed by materials due to their ability to promote the vibration and/or rotation of molecules. The analysis is carried out at a wavelength where the water molecules absorb radiation, but none of the other components in the food matrix do. A measurement of the absorption of radiation at this wavelength can then be used to determine the moisture content: the higher the moisture content, the greater the absorption. Instruments based on this principle are commercially available and can be used to determine the moisture content in a few minutes or less.

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In another embodiment, a chemical reaction, such as a colometric reaction, can be used for the determination of moisture in the agave syrup product. The Karl Fischer titration is often used for determining the moisture content of foods that have low water contents (e.g. dried fruits and vegetables, confectionery, coffee, oils and fats). It is based on the following reaction:



This reaction was originally used because HI is colorless, whereas I₂ is a dark reddish brown color, hence there is a measurable change in color when water reacts with the added chemical reagents. Sulfur dioxide and iodine are gaseous and would normally be lost from solution. For this reason, the above reaction has been modified by adding solvents (e.g., C₅H₅N) that keep
10 the S₂O and I₂ in solution, although the basic principles of the method are the same. The food to be analyzed is usually placed in a beaker containing solvent and is then titrated with Karl Fischer reagent (a solution that contains iodine). While any water remains in the sample the iodine reacts with it and the solution remains colorless (HI), but once all the water has been used up any additional iodine is observed as a dark red brown color (I₂). The volume of iodine
15 solution required to titrate the water is measured and can be related to the moisture content using a pre-prepared calibration curve. The precision of the technique can be improved by using electrical methods to follow the end-point of the reaction, rather than observing a color change.

One particular advantage of the solid agave syrup product described herein is that, during its dehydration process, no additives are being added to facilitate water removal, to stabilize the
20 resulting dehydrated product or to limit the adhesion of the product to its packaging membrane.

When the agave syrup product is wrapped in a water-impermeable package, its storage time is of about three years or even more (depending on the WVTR of the package). During storage, the product does not substantially reabsorb water and as such its water content is substantially constant. As used herein, an agave syrup product that does not "substantially" reabsorb water is
25 a agave syrup product that possesses a water content of less than about 0.5% w/w during its storage. As indicated above, when the water content of the agave syrup product exceeds 0.5% w/w, the agave syrup product becomes tacky.

Another advantage of the solid agave syrup product described herein is that the majority of the sugars present are in an uncrystallized form. As used herein the term "uncrystallized" refer to
30 the absence of sugar crystals that can be felt in the mouth and/or visible to the naked eye. The agave syrup product has a smooth texture and does not contain granulated agave syrup crystals which can be seen by the naked eye or be felt in the mouth.

A further advantage of the agave syrup product described herein is that, once cooled at room temperature after dehydration (but prior to other processing steps), it is a translucent product
35 having the color characteristics of the original agave syrup (e.g. translucent/transparent/clear or,

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in some embodiments, presenting shades of yellow and/or brown). However, upon water removal, it is assumed that the solid agave syrup product will have an increase in color intensity that the shade of product could be perceived as different (e.g. darker) than in the liquid agave syrup.

5 Another advantage of the agave syrup product described herein is that, once cooled at room temperature after vacuum dehydration (but prior to other processing steps) it has the organoleptic properties of the original agave syrup (flavor, intensity, mouth feel), e.g. a distinct agave flavor. However, upon water removal, it is assumed that the solid agave syrup product will have an increase in flavor intensity and stickiness and that the sweetness level of product
10 could be perceived as different (e.g. heightened) than in the liquid agave syrup.

As indicated above, the solid agave syrup product is not limited to a specific manufacturing technique. In one advantageous embodiment and as shown below, the liquid agave syrup is submitted to vacuum drying to lower its water content and generate the agave syrup product. During the dehydration process, the liquid agave syrup is not supplemented with an exogenous
15 source of additive (such as for example, a polysaccharide selected from the group consisting of polyol, sucrose and high-fructose corn syrup). The time, temperature and pressure variables used should be designed to generate a solid agave syrup product having similar organoleptic characteristics as the original liquid (e.g. hydrated) agave syrup. In an embodiment, the liquid agave syrup can be heated from ambient temperature of less than 98°C (e.g. 97°C, 96°C, 95°C,
20 94°C, 93°C, 92°C, 91°C or 90°C for example). While the temperature is gradually increased, a pressure of at least 26 inHg (27 inHg or 28 inHg for example) is applied to the liquid agave syrup. This vacuum is maintained until the moisture content reaches a specific threshold (for example less than 0.5%, 0.4%, 0.3%, 0.2%, 0.1%, 0.09%, 0.08%, 0.07%, 0.06%, 0.05%, 0.04%, 0.03%,
25 0.02% or 0.01%), depending on the final application of the product. The dehydration process for the production of the solid agave syrup product can last at least 60 minutes, at least 70 minutes, at least 80 minutes, at least 90 minutes, at least 100 minutes, at least 110 minutes or at least 120 minutes. The dehydration process is preferably conducted under constant stirring (or any other techniques known in the art) to evenly distribute the temperature in the agave syrup that is being dehydrated and/or to avoid burning of the agave syrup. As it is known in the art, the
30 temperature, vacuum and time parameters can be modified to reach the desired temperature. These parameters will also depend on the amount of liquid agave syrup that is being processed as well as the content of original the liquid agave syrup (such as its moisture content).

Once the solid agave syrup product has been dehydrated (e.g. reached its moisture content equal to or less than 0.5%), it can be deposited into molds and cooled at room temperature. In
35 some embodiments, the dehydrated agave syrup product is deposited into molds. The deposition into mold is preferably performed when the dehydrated agave syrup is at a

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temperature higher than the temperature it sets into a solid, for example, above 60°C (and, in an embodiment, up to 90°C). It should be noted that the dehydrated agave syrup (even at temperature higher than the temperature it sets into a solid) cannot be extruded as it is too soft to sustain such process. The cooled solid agave syrup product can be manufactured to any size that is convenient for the end-use, for example in formats ranging from µg to kg.

Optionally, the solid agave product can be packaged. Because of the hygroscopic nature of the dehydrated agave syrup product, it will tend to reabsorb water if it is not placed in a water impermeable package. For example, and depending on the relative humidity of the environment, if the product is left at ambient temperature, within a couple of days, it can become tacky and, within a couple of weeks, it can become sticky. As such, in order to prolong the shelf life of the product, it can be packaged in a water-impermeable membrane. As used herein, a "water-impermeable package" or "water-impermeable membrane" refers to a material that limits the transmission of water vapor. In an embodiment, the water vapor transmission rate (WVTR) of the "water-impermeable" package or membrane is below 0.1 gm/100 in² or below about 0.01 gm/100 in². Because the agave syrup product is mainly used as a food or as a food additive, the package can be of food or pharmaceutical grade. Further, since the package can optionally be submitted to heat to seal it around the agave syrup product, the package or membrane can also be resistant to heat.

Once the agave product has been dehydrated, it can optionally be further processed into an agave composition. For example, in an embodiment, it is contemplated that a flavor can be added to the solid agave syrup product described after it has been dehydrated (but prior to the product setting into a solid). The added flavor may be, for example, a sweet or a savory flavor. Sweet flavors include, but are not limited to fruits (peach, pear, apple), citrus (orange, lemon, lime), berry (raspberry, strawberry, blueberry), spice (vanilla, cinnamon, clove, lavender), caramel, butterscotch, maple, mint (spearmint, menthol). Savory flavors include, but are not limited to, ginger, pepper (black, white, pink, green, hot), etc. Other flavors, such as coffee, tea, herbal tea and/or alcohol, can also be added. In an embodiment, the flavor can be derived from an oil, a powder or an extract (such as, for example, an alcohol extract). In one preferred embodiment, the solid agave product is combined with a menthol and a eucalyptus flavor.

In other optional or complementary embodiments, a preservative can be added to the dehydrated agave product (after its dehydration) to prolong its self-life, delay or limit water reabsorption and/or preserve the formation of crystals. Such preservative can be an emulsifier, an anti-sticking agent and/or a stabilizer, including, but not limited to bee wax, carnauba wax, a sugar (such as trehalose and/or sucrose), a sugar alcohol or polyol (such as, for example, methanol, ethylene glycol, glycerol, erythritol, threitol, arabitol, ribitol, xylitol, mannitol, sorbitol, galactitol, iditol, volemitol, fucitol, inositol, maltitol, lactitol, isomalt, maltotriitol, maltotetraitol

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and/or polyglycitol) and/or other food/pharmaceutical processing aids. In one exemplary embodiment, the solid agave syrup product (optionally previously crushed or powdered) is admixed with a processing aid (for example a sugar alcohol) for delivering a therapeutic product.

- 5 In other optional or complementary embodiments, a preservative can be added to the dehydrated agave syrup to prolong its self-life, delay or limit water reabsorption and/or preserve the formation of crystals. Such preservative can be an emulsifier, an anti-sticking agent and/or a stabilizer, including, but not limited to bee wax, carnauba wax, maltodextrin, dextrose or other food/pharmaceutical processing aids.
- 10 The solid agave product can be used without any further processing, mostly as a sweetener in food applications. However, the solid agave syrup product can be further processed for use in other food applications (such as confectionary, dessert topping and/or sweet ingredient), in natural products as well as in pharmaceutical applications (such as throat lozenges). In such instances, the solid agave syrup product can be further powdered, crushed, ground and/or
- 15 granulated for these additional applications.

Particles can thus be made from the solid agave syrup product and used in various applications. For example, when a coarser particle is required, the solid agave syrup can be processed into a "granular" form particles having a size distribution that ranges between about 0.25 and 2 mm. On the other hand, when a finer particle is needed, the solid agave syrup product can be

20 processed into a "powder" form particles having a size distribution that ranges between 62.5 to 125 μm . The size distribution of the particles can be assessed by the techniques known in the art, such as the Gates-Gaudin-Schuhmann method, the Rosin-Rammler method, the modified Gaudin-Meloy method, the Log-normal method and/or the modified beta method. Similar to what has been indicated above for the solid agave syrup products, the particles of the solid agave

25 syrup can also be packaged in a water-impermeable membrane to slow down, delay or prevent water reabsorption.

The agave syrup product or the agave composition as described herein can be advantageously used to sweeten a beverage. When the solid agave syrup product is placed in an aqueous-based beverage, it reabsorbs water and dissolves to sweeten the beverage. The application of

30 the agave syrup product is not limited to a specific type of beverage or to beverages having a specific temperature.

Because of the excellent palatable properties of the solid agave syrup, the agave syrup product or the agave composition described herein can be further processed into a confectionery. In order to introduce the solid agave syrup product into a confectionery, and as indicated above, it

35 can be physically processed (crushed, powdered, coated in a solution) and/or flavors can be

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added. Alternatively or concomitantly, the manufacturing process of the product can also be altered to introduce additional components of the confectionery.

Further, the solid agave syrup can be formulated into a pharmaceutical composition to improve its taste (e.g. providing a sweet taste), without influencing too much the glycemic index of the composition. Such agave-based pharmaceutical composition can be especially useful for designing pharmaceutical formulations for individuals suffering from diabetes.

The present invention will be more readily understood by referring to the following examples which are given to illustrate the invention rather than to limit its scope.

EXAMPLE I – PRODUCTION OF SOLID AGAVE SYRUP PRODUCT

The ingredient used in the following protocols is 100% agave syrup. The initial moisture content of agave is between 22 to 26%. The agave syrup is poured into a reactor vessel and a vacuum of 26 to 28 inches of Hg was applied. The time and temperatures applied are presented in the protocols. The agave syrup is stirred with a rotating paddle throughout process at a constant rate of 30 rpm. Prior to dispensing the evaporated agave syrup product in the molding trays, an aliquot was removed to determine the moisture content using an infra-red moisture meter in order to rapidly assess the moisture content. The evaporated agave syrup was then deposited into molding trays and cooled to room temperature.

Protocol A. The agave syrup was submitted to a vacuum dehydration at a temperature of 98°C, under a vacuum of 28 inches of Hg (at T= 0), as provided in Table A. After 60 minutes, the vacuum was released and the product was poured into molds. During the process, flash boiling was observed as soon as constant vacuum applied. Vacuum was released and reapplied in order to keep the agave syrup from entering the vacuum tubing. The final product obtained did not set into a solid after cooling. The moisture content of the end product, as measured with an infra-red-meter, was determined to be greater than 2.0% (w/w).

Table A. Time and temperature parameters of protocol A.

Time (minutes)	Temperature (°C)
0	45
5	50
10	55
15	60
20	65
25	70
30	75
35	80
40	85
45	90
50	95

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Time (minutes)	Temperature (°C)
55	98
60	98

Protocol B. The agave syrup was submitted to a vacuum dehydration at a temperature of 98°C, under a vacuum of 28 inches of Hg (at T = 0), as provided in Table B. After 80 minutes, the vacuum was released and the product was poured into molds. During the process, flash boiling was observed as soon as a temperature of 40°C was reached. Vacuum was released and reapplied in order to keep the agave syrup from entering the vacuum tubing. The final product obtained did not set into a solid after cooling. The moisture content of the end product, as measured with an infra-red moisture meter, was determined to be greater than 1.18% (w/w).

Table B. Time and temperature parameters of protocol B.

Time (Minutes)	Temperature (°C)
0	30
5	35
10	40
15	45
20	50
25	55
30	60
35	65
40	70
45	75
55	80
60	85
65	90
70	95
75	98
80	98

Protocol C. The agave syrup was submitted to a vacuum dehydration at a temperature of 90°C, under a vacuum of 28 inches of Hg (at T = 0), as provided in Table C. After 110 minutes, the vacuum was released and the product was poured into molds. No flash boiling was observed during the process. Fluidity of final product (at temperatures between 60 and 90°C) after dehydration was appropriate for depositing into moulds. The final product obtained did set into a solid after cooling and had a translucent appearance. The moisture content of the end product, as measured with an infra-red moisture meter, was determined to be greater less than 0.05% (w/w).

Table C. Time and temperature parameters of protocol C.

Time (minutes)	Temperature (°C)
0	30

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Time (minutes)	Temperature (°C)
5	30
10	35
15	35
20	35
25	35
30	40
35	40
40	40
45	45
50	50
55	55
60	60
65	65
70	70
75	75
80	80
85	85
90	90
95	90
100	90
105	90
110	90

Protocol D. The agave syrup was submitted to a vacuum dehydration at a temperature of 90°C, under a vacuum of 28 inches of Hg (at T = 0), as provided in Table D. After 85 minutes, the vacuum was released and the product was poured into molds. No flash boiling was observed during the process. Fluidity of final product (at temperatures between 60 and 90°C) after dehydration was appropriate for depositing into moulds. The final product obtained did set into a solid after cooling and had a translucent appearance. The moisture content of the end product, as measured with an infra-red-meter, was determined to be greater less than 0.05% (w/w).

Table D. Time and temperature parameters of protocol D.

Time (minutes)	Temperature (°C)
0	35
5	35
10	35
15	35
20	40
25	40
30	45
35	50
40	55
45	60
50	65
55	70
60	75
65	8

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Time (minutes)	Temperature (°C)
70	85
75	90
80	90
85	90

Protocol E. The agave syrup was submitted to a vacuum dehydration at a temperature of 90°C, under a vacuum of 28 inches of Hg (at T = 0), as provided in Table E. After 70 minutes, the vacuum was released and the product was poured into molds. No flash boiling was observed during the process. Fluidity of final product (at temperatures between 60 and 90°C) after dehydration was appropriate for depositing into moulds. The final product obtained did set into a solid after cooling and had a translucent appearance. The moisture content of the end product, as measured with an infra-red-meter, was determined to be less than 0.05% (w/w).

Table E. Time and temperature parameters of protocol E.

Time (minutes)	Temperature (°C)
0	35
5	40
10	40
15	40
20	40
25	42
30	42
35	45
40	45
45	50
50	60
55	70
60	80
65	90
70	90

While the invention has been described in connection with specific embodiments thereof, it will be understood that it is capable of further modifications and this application is intended to cover any variations, uses, or adaptations of the invention following, in general, the principles of the invention and including such departures from the present disclosure as come within known or customary practice within the art to which the invention pertains and as may be applied to the essential features hereinbefore set forth, and as follows in the scope of the appended claims.

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WHAT IS CLAIMED IS:

1. A solid agave syrup product consisting essentially of an agave syrup having a moisture content equal to or less than about 0.5% (w/w).
2. The solid agave syrup product of claim 1, wherein the moisture content is equal to or less than about 0.3 %.
3. The solid agave syrup product of claim 1, wherein the moisture content is equal to or less than about 0.1%.
4. The solid agave syrup product of claim 1, wherein the moisture content is equal to or less than about 0.05%.
5. The solid agave syrup product of claim 1, wherein the moisture content is equal to or less than about 0.01%.
6. The solid agave syrup product of any one of claims 1 to 5, wherein the sugars of the solid agave syrup product are in an uncrystallized form.
7. The solid agave syrup product of any one of claims 1 to 6, wherein the solid agave syrup product is translucent.
8. The solid agave syrup product of any one of claims 1 to 7 produced by a process comprising submitting a liquid agave syrup to a vacuum of at least 28 inHg, to a raise in temperature from room temperature to 90°C and for a period of time of at least 70 minutes to obtain a dehydrated agave syrup product.
9. The solid agave syrup of claim 8, wherein the process further comprises cooling the dehydrated agave syrup to room temperature.
10. The solid agave syrup product according to claim 9, wherein the process further comprises processing the solid agave syrup in a powder.
11. The solid agave product according to any one of claims 8 to 10, wherein the process further comprises placing the solid agave product in a water-impermeable package.
12. The solid agave syrup product of any one of claims 1 to 11 for use as a sweetener.
13. An agave composition comprising the solid agave syrup product of any one of claims 1 to 11 and at least one an additive.
14. The agave composition of claim 13, wherein the at least one additive comprises a flavor.
15. The agave composition of claim 14, wherein the flavor is selected from the group consisting of spearmint, eucalyptus, menthol and lemon.

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16. The agave composition of claim 14, wherein the flavor is a combination of eucalyptus and menthol.
17. The agave composition of any one of claims 13 to 16, wherein the at least one additive comprises a preservative.
18. The agave composition of claim 17, wherein the preservative is a sugar alcohol.
19. The agave composition of any one of claims 13 to 18, wherein the composition is a confectionary.
20. The agave composition of any one of claims 13 to 18, wherein the composition is a pharmaceutical composition.
21. The agave composition of claim 20, wherein the composition is a throat lozenge.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2013/050538

A. CLASSIFICATION OF SUBJECT MATTER

IPC: **C13K 3/00** (2006.01) , **A23G 3/42** (2006.01) , **A23L 1/09** (2006.01) , **A61K 36/88** (2006.01)

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)

C13K (2006.01), C13B (2011.01), A23G (2006.01), A23L (2006.01)

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

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

Canadian Patent Database, US Patent Database, EPOQUE, Total Patent

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	WO 2012/149069 (Quevedo, J.) 1 November 2012 (01-11-2012) Whole document	1-21
A	US 2009/0226575 (Roman et al.) 10 September 2009 (10-09-2009) Whole document	1-21

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

19 September 2013 (19-09-2013)

Date of mailing of the international search report

20 September 2013 (20-09-2013)

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2013/050538

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
WO2012149069A2	01 November 2012 (01-11-2012)	None	
US2009226575A1	10 September 2009 (10-09-2009)	US2008063731A1 US2008268109A1	13 March 2008 (13-03-2008) 30 October 2008 (30-10-2008)