

METHOD OF STORING PRODUCE AND PRODUCING A BEVERAGE**FIELD OF INVENTION**

5 The invention relates to a method of maintaining and/or enhancing the desirable characteristics of harvested produce and a packaged beverage that utilises the method. In particular, the invention relates to a packaged beverage comprising harvested produce in a drinkable storage solution.

10

BACKGROUND

Customers prefer to purchase and consume produce that is perceived to be fresh. Many desirable characteristics are associated with fresh produce
15 including nutritional value, flavour and texture. These desirable characteristics are frequently lost when fresh produce is stored for anything more than a minimal period of time. The nutritional value and flavours of fresh produce are associated with labile components that are lost by way of metabolism or degradation by abiotic factors such as
20 oxygen and heat. Likewise, the texture of fresh produce may deteriorate if over ripening or dehydration occurs. The loss of these desirable characteristics is particularly pronounced in stored produce such as fruit. Fruit may rapidly become unpalatable unless steps are taken to inhibit or at least limit metabolism and degradation. These steps may
25 include storage in controlled temperature and controlled atmosphere environments.

Storage in controlled temperature and controlled atmosphere environments, whilst reducing the deterioration in fruit quality attributable to
30 metabolism to a certain extent, does not exclude a degree of dehydration of the fruit. Dehydrated fruit lacks its turgid or crisp texture and is unappealing to the consumer. Nor is the degree of dehydration sufficient to prevent degradation by biotic factors, such as postharvest storage rots. Indeed, the degree of dehydration may promote storage rots. Many
35 other methods have been explored for the storage and preservation of produce, in particular fruit. These methods invariably result in the loss of desirable characteristics of the fruit. The methods include the immersion of the fruit or the application to the fruit of hypertonic solutions to partially dehydrate the fruit. The dehydrated fruit may
40 then be infused with humectants to improve the texture of the fruit in

such a way as to mimic the texture of fully hydrated fresh fruit, or at least provide a mouth feel and texture that is acceptable to consumers.

Tressler and Evers (1957) in 'The Freezing Preservation Of Foods'

- 5 (Westport: Avi Publishing) describe a method of treating peaches prior to storage with a mixture of ascorbic acid and sugar in order to draw out some of the juice and obtain some penetration of the ascorbic acid and the sugar. The peach slices are mixed with one quarter of their weight of sugar containing 0.6% of ascorbic acid and allowed to stand for 2 to 3
10 hours. The peaches thus prepared are used in the preparation of a filling for a pie. Nicotra et al (1973) in 'Considerations Of The Suitability For Freezing Of Some Peach And Apricot Varieties' (Proceedings of the 13th International Congress of Refrigeration, "Progress in Refrigeration Science and Technology" International
15 Institute of Refrigeration) describes studies with different times of dipping of fruit pieces in different types of syrup with and without calcium salts. Three calcium salts were tested by adding them to the syrup to prevent or reduce the loss of firmness of the flesh. The methods of Tressler and Evers (1957) and Nicotra et al (1973) are both
20 directed towards preserving fruit where the fruit is dehydrated and then frozen.

- The specification accompanying United Kingdom patent application no. 1375704 (Johnson (1974)) describes a process for preserving fruit. The
25 process comprises effecting the absorption of a humectant chosen from glycerol, propylene glycol, sorbitol, or any other polyhydric alcohol capable of acting as a humectant into the food and thereafter affecting partial removal of water from the fruit to obtain a partially dehydrated product. The level of dehydration is such that the water activity of the
30 food is below that at which bacterial and enzymatic activity take place. The partially dehydrated produce is then stored, for example, as a freeze-dried product. The specifications accompanying United States patent nos. 4,256,772 (Shanbhag et al), 4,364,968 (Waitman and Frank), 4,542,033 (Agarwala) and 5,364,643 (Morimoto and Lugay) also describe
35 methods of improving the storage characteristics of produce, including fruit. The produce is immersed in a solution containing an aqueous solution of an edible polyhydric alcohol and/or carbohydrate at a concentration sufficient to dehydrate the produce and allow infusion with the edible humectant. In each of the methods described in these patent
40 specifications the fruit is exposed to a coating or solution that is

hypertonic, thereby dehydrating and preserving the produce. Infusion with the humectant is directed to improving the texture of the preserved produce. Similarly, the specification accompanying international application no. PCT/US1999/000181 (publ. no. WO 99/35917) (Hirschberg
5 (1999)) describes methods of infusing phytochemicals, nutraceuticals, and other compositions into food products. The claimed method of infusing a composition into a food product includes the step of increasing the Brix of a dehydration solution containing the food product over a period of time. The method seeks to maintain or enhance the quality of the stored
10 produce by partially dehydrating the produce and infusing the produce with substances that substitute for and mimic the natural characteristics of the fresh produce. These known methods are in accordance with the paradigm that the water activity of the stored food must be reduced to a certain level to prevent deterioration by biotic factors. The water
15 activity is reduced by dehydration. Dehydration is achieved by application to the produce or immersion of the produce in a hypertonic solution.

The specification accompanying United States patent no. 4,879,127 (Liu et
20 al (1989)) describes a process for storing diced or sliced produce for extended periods of time prior to further processing. The produce is immersed in a substantially isotonic aqueous storage solution. The produce is then stored at a reduced temperature prior to canning and sterilisation. The specification accompanying United States patent no.
25 4,996,070 (Nafisi-Movaghar (1991)) describes a process for preparing natural fruit flavour extracts. The extract is produced by preparing an infusion solution and immersing a fruit in the solution for a period of time to infuse the fruit with the solution. After infusion, the solution contains significant portions of the fruit sugars, colours, flavours and
30 pectins from the fruit. The process described is directed to the extraction of fruit flavours without preservation of the fruit. Furthermore, none of the examples provided describe the extraction of fruit flavours from whole fruit. These known methods do not seek to maintain or enhance the natural characteristics of the stored produce.
35 The known methods are not applicable to the storage of whole produce, in particular whole fruit. Generally, the known methods are directed to the storage and preservation of produce with a view to its subsequent use in processed food products. By contrast, the specification accompanying United States patent application no. 11/454,814 (publ. no. US
40 2006/0233922) (Kegler et al (2006)) describes a method of enhancing the

flavour of fruits or vegetables within its own product packaging to extend the shelf life and allow for mass production and mass distribution of the flavour enhanced fruits or vegetables, and the packaged flavour enhanced fruits or vegetable products produced by such methods. The
5 methods comprise introducing carbon dioxide (CO₂) as a means of enhancing fruit characteristics, but uses known means, i.e. freezing, to achieve preservation of the flavour enhanced fruit during storage.

An object of this invention is to provide a packaged beverage comprising
10 harvested produce in a drinkable storage solution. An object of this invention is to provide a method of maintaining and/or enhancing the natural characteristics of produce. These objects are to be read disjunctively with the object to at least provide the public with a useful choice.

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STATEMENTS OF INVENTION

In a **first** aspect the invention provides a packaged beverage consisting of a releasably sealed container containing harvested produce immersed in
20 an aqueous storage solution where the container comprises a first releasable seal and a second releasable seal configured to permit the egress of the storage solution without the harvested produce when the first releasable seal is released and egress of the harvested produce when the second releasable seal is released.

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Preferably, a neutral water potential is established when the harvested produce is immersed in the aqueous storage solution.

Preferably, the storage solution is a moderately hypotonic to
30 substantially isotonic storage solution.

Preferably, there is no significant change in the Brix value of the storage solution of the packaged beverage during the period of storage.

35 Preferably, the storage solution is a carbonated storage solution.

Preferably, the storage solution is an alcoholic storage solution. More preferably, the storage solution is an alcoholic storage solution where the source of alcohol is selected from the group consisting of: pomace
40 brandy, triple sec liqueur, gin, vodka and whisk(e)y (or bourbon).

Preferably, the storage solution comprises a combination of solutes selected from the group consisting of: artificial sweeteners and polyhydric alcohols (polyols). More preferably, the storage solution comprises a combination of artificial sweeteners and polyhydric alcohols (polyols) where the artificial sweeteners are selected from the group consisting of: SUCARYL™ (Abbott) (sodium cyclamate 8% (w/v) (952), sodium saccharin 0.8% (w/v) (954), benzoic acid 0.1% (210)); EQUAL™ (Merisant) (5% Benzoic acid (210), potassium benzoate (212)) and SUGORMAX™ (Hansells) (16% sodium cyclamate, 4% saccharin, malic acid, preservatives (211, 202)) and the polyhydric alcohols (polyols) are selected from the group consisting of: glycerol, inositol, mannitol, and sorbitol.

In a first embodiment of the first aspect of the invention the harvested produce is whole fruit. More preferably, the harvested produce is whole fruit selected from the group consisting of: apple, blackberries, blueberries, cherries, citrus, grapes, kiwifruit, peaches, pear, plums, raspberries and strawberries.

In a second embodiment of the first aspect of the invention the harvested produce is diced root vegetables. More preferably, the harvested produce is diced root vegetables selected from the group consisting of: beetroot, carrot and ginger.

In a **second** aspect the invention provides a method of storing harvested produce comprising the step of immersing the harvested produce in an aqueous storage solution contained in a releasably sealed container to establish a neutral water potential.

Preferably, the storage solution is a moderately hypotonic to substantially isotonic storage solution.

Preferably, there is no significant change in the Brix value of the storage solution during the period of storage.

Preferably, the storage solution is a carbonated storage solution.

Preferably, the storage solution is an alcoholic storage solution. More preferably, the storage solution is an alcoholic storage solution where

the source of alcohol is selected from the group consisting of: pomace brandy, triple sec liqueur, gin, vodka and whisk(e)y (or bourbon).

Preferably, the storage solution comprises a combination of solutes
5 selected from the group consisting of: artificial sweeteners and polyhydric alcohols (polyols). More preferably, the storage solution comprises a combination of artificial sweeteners and polyhydric alcohols (polyols) where the artificial sweeteners are selected from the group consisting of: SUCARYL™ (Abbott) (sodium cyclamate 8% (w/v) (952),
10 sodium saccharin 0.8% (w/v) (954), benzoic acid 0.1% (210)); EQUAL™ (Merisant) (5% Benzoic acid (210), potassium benzoate (212)) and SUGORMAX™ (Hansells) (16% sodium cyclamate, 4% saccharin, malic acid, preservatives (211, 202)) and the polyhydric alcohols (polyols) are selected from the group consisting of: glycerol, inositol, mannitol, and
15 sorbitol.

Preferably, the container is a releasably sealed container. More preferably, the container is a releasably sealed container where the container comprises a first releasable seal and a second releasable seal
20 configured to permit the egress of the storage solution without the harvested produce when the first releasable seal is released and egress of the harvested produce when the second releasable seal is released.

In a first embodiment of the second aspect of the invention the harvested
25 produce is whole fruit. More preferably, the harvested produce is whole fruit selected from the group consisting of: apple, blackberries, blueberries, cherries, citrus, grapes, kiwifruit, peaches, pear, plums, raspberries and strawberries.

30 In a second embodiment of the second aspect of the invention the harvested produce is diced root vegetables. More preferably, the harvested produce is diced root vegetables selected from the group consisting of: beetroot, carrot and ginger.

35 In the description and claims of this specification the following acronyms, terms and phrases have the meaning provided: "Alcoholic storage solution" means an aqueous storage solution to which a portion of alcohol has been added; "Aqueous storage solution" means a storage solution prepared by the addition of solutes to water; "Comprising" means
40 "including", "containing" or "characterized by" and does not exclude any

additional element, ingredient or step; "Consisting of" means excluding any element, ingredient or step not specified except for impurities and other incidentals; "Diced" means cut into pieces; "Dry weight" means the weight after drying to constant weight; "Harvested" means produce is
5 gathered and placed in a container after the produce has grown to a harvestable form; "Molarity" means the concentration (M) in an aqueous solution of a solute; "M" denotes mole (mol) per litre (L); "Mole" means the amount of substance that contains as many entities (atom, molecules, ions, electrons, photons etc.) as there are atoms in 12g of ^{12}C ;
10 "Molecular species" means the charged or uncharged molecules formed when a solute is dissolved in an aqueous medium to provide an aqueous solution; "Neutral water potential" means the water potential of a storage solution at which there is no significant increase in the wet weight of the harvested produce (in this context "no significant
15 increase" means no more than 5% for whole fruit (preferably no more than 2.5%) or no more than 10% for diced vegetables (preferably no more than 5%), or in the alternative the water potential of a storage solution at which there is minimal rupturing of cells (as indicated by no significant change in the Brix value of the storage solution); "Solute" means the
20 molecule or salt dissolved in an aqueous medium; "Tonicity" means the sum of the concentrations (M) in an aqueous solution of molecular species to which a plant cell membrane is impermeable.

It will be understood from the foregoing definitions that a solute that
25 is a molecule may form one or more molecular species when dissolved in an aqueous medium. It will be recognised that the concentrations (M) of molecular species in an aqueous solution are influenced by the degree of dissociation (if any) of the solute when dissolved in the aqueous medium. It will also be recognised that in the solutions used in the present
30 invention molecular species may be sequestered by mechanisms such as adsorption and chelation. The degree of adsorption, chelation, dissociation and volume of the aqueous solution is also influenced by variables such as temperature. For these reasons the phrases "neutral water potential", "moderately hypotonic" and "substantially isotonic" are
35 to be understood in a functional sense. A "neutral water potential" is readily determinable for a given combination of diced or whole harvested produce and concentrations of solutes in a storage solution on the basis of no significant change in the wet weight of the harvested produce or no increase in the Brix value of the storage solution. "Hypotonic" and
40 "isotonic" mean with respect to the tonicity of the cells of the

harvested produce to be stored prior to immersion in the storage solution. Accordingly, the phrase "moderately hypotonic to substantially isotonic" encompasses a range with respect to the tonicity of the harvested produce to be stored sufficient to maintain the hydration of the produce and establish the neutral water potential without the outer skin or peel of the produce or membranes of the cells rupturing. The required concentration of solutes can be readily determined employing the methods illustrated in the Examples.

Where concentrations or ratios are specified in respect of the preparation of a storage solution the concentration or ratio specified is the initial concentration or ratio in the storage solution. Where values are expressed to one or more decimal places standard rounding applies. For example, 1.7 encompasses the range 1.650 recurring to 7.499 recurring. The terms "first", "second", "third", etc. when used with reference to alternative embodiments of the invention, or with reference to different elements, features or integers of the subject matter defined in the Statements of Invention and Claims, are not intended to imply an order of preference.

20

BRIEF DESCRIPTION OF DRAWINGS

Figure 1. Representation of a first embodiment consisting of a can-shaped releasably sealed container (1) containing harvested produce (7) immersed in a storage solution (8) as described in the specification.

Figure 2. A sequence of representations in accordance with the first embodiment illustrating the release of the first releasable seal (5) by pulling the ring (10) and the release of the second releasable seal (6) by pulling the ring (12).

Figure 3. A sequence of representations in accordance with the first embodiment illustrating the egress of the stored produce from the container (1) following release of the second releasable seal (6) to provide an opening (13). The harvested produce (7) is collected on a plate (14).

Figure 4. A photograph of a mock-up of a lid (4) of a container in accordance with the first embodiment comprising a first releasable seal and a second releasable seal showing a possible configuration of the

associated ring pulls.

Figure 5. Photographs illustrating an apple (Figure 5a), a clear walled container containing a carbonated storage solution (Figure 5b) and a
5 container containing the apple immersed in the carbonated storage solution (Figure 5c) in accordance with the first embodiment.

Figure 6. Photographs illustrating a kiwifruit (Figure 6a), a clear walled container containing a carbonated storage solution (Figure 6b) and
10 a container containing the kiwifruit immersed in the carbonated storage solution (Figure 6c) in accordance with the first embodiment.

Figure 7. Photographs illustrating a lemon (Figure 7a), a clear walled container containing a carbonated storage solution (Figure 7b) and a
15 container containing the lemon immersed in the carbonated storage solution (Figure 7c) in accordance with the first embodiment.

Figure 8. Photographs illustrating a lime (Figure 8a), a clear walled container containing a carbonated storage solution (Figure 8b) and a
20 container containing the lime immersed in the carbonated storage solution (Figure 8c) in accordance with the first embodiment.

Figure 9. Representation of a second embodiment consisting of a bottle shaped releasably sealed container (1) containing harvested produce (7)
25 immersed in a storage solution (8) as described in the specification.

Figure 10. A sequence of representations in accordance with the second embodiment illustrating the release of the first releasable seal by
unscrewing the top cap (18) and the release of the second releasable seal
30 by unscrewing the base cap (17).

Figure 11. Representations in accordance with the second embodiment illustrating the egress of the harvested produce from the container (1) following release of the second releasable seal to provide an opening
35 (13). The harvested produce (7) is collected on the base cap (17).

Figure 12. Representations of two alternatives of a third embodiment consisting of a pouch-shaped container (1) containing harvested produce (7) immersed in a storage solution (8) as described in the specification.

5 **Figure 13.** A sequence of representations in accordance with the third embodiment illustrating the release of the first releasable seal by unscrewing the cap (5).

Figure 14. Representations in accordance with the third embodiment
10 illustrating release of the second releasable seal by tearing open the pouch-shaped container to provide an opening.

DETAILED DESCRIPTION

15 The inventor has adopted a new paradigm when considering the storage of harvested produce. Rather than seeking to reduce the water activity of stored produce to a level that inhibits enzyme and bacterial activity with a view to preservation, the method described here seeks to maintain the vitality of fresh produce or to revitalise stored produce by
20 maintaining or returning the water activity of the produce at or to that of fresh produce. Surprisingly, the inventor has discovered that under these conditions the produce can be preserved in a releasably sealed container for significant periods of time. Additional advantages accrue, such as the provision of a drinkable storage solution. The method allows
25 for what the inventor characterises as the "reverse ripening" of harvested produce. Whilst one objective is to maintain the natural characteristics of stored produce, it will also be recognised by those skilled in the art, and as demonstrated here, that in addition the natural characteristics of stored produce can also be enhanced or new
30 qualities introduced. Stored fruit revitalised according to the method may be preserved for periods of 30 to 45 days, or 60 to 90 days at reduced temperatures of 2 to 5°C, depending upon the fruit type.

Provided the tonicity of the storage solution is moderately hypotonic or
35 substantially isotonic with respect to the tonicity of the fruit to be stored prior to immersion in the solution, a neutral water potential between the interna of the whole fruit and the solution will be established. The outer membranes of cells are semi-permeable. These cell membranes allow the passage of water and certain solutes. Plant
40 cells are also surrounded by a semi-rigid cell wall. The characteristics

of this cell wall may also affect the passage of water and solutes. The passage of water across the outer membrane of a plant cell is determined by potentials including: Osmotic potential (controllable by solute concentration); Turgor potential (determined by the hydrostatic pressure of the contents of a cell); and Matric potential (dependent in part on the nature of the cell wall). The summation of these potentials is the "water potential" between the inside and outside of the cell. The turgor potential is related to the condition of the harvested produce. Freshly harvested produce typically has a relatively high turgor potential.

Stored fruit, which has become at least partially dehydrated, has a lower turgor potential or may even be flaccid. Matric potential is related to the characteristics of the cell membrane and cell wall which is in turn related to the type of produce. The contribution matric potential makes to the water potential will vary between different types of fruit. The matric potential will differ, for example, between grapes and apples. For whole fruit, the characteristics of the outer skin of the fruit will also have an influence on the water potential. Where whole fruit with a permeable outer skin is immersed in a hypotonic solution there will be a net uptake of water due to the osmotic potential between the inside of the cells and the immersion solution. With the uptake of water the turgor potential will increase; an increase in the volume of the cells is limited by the semi-rigid cell wall. An increase in the volume of the whole fruit is limited by the outer skin or peel of the fruit; the outer skin or peel of the fruit will rupture if the solution is too hypotonic.

If the turgor potential is insufficient to counter the uptake of water attributable to the osmotic potential, a "neutral water potential" will not be established. "Neutral water potential" is defined as being a balance between the osmotic, turgor and matric potentials that is established and results in a zero net passage of water between the interior of the whole fruit and the solution as manifested in there being no significant change in the portion of the wet weight of the harvested produce attributable to the weight of water before and after immersion of the harvested produce in the storage solution or in the Brix value of the storage solution remaining constant. Significant changes in the Brix value of the storage solution are indicative of cell membranes being ruptured.

Whilst not wishing to be bound by theory it is believed the desirable characteristics of the harvested produce are maintained and/or regained under conditions of "neutral water potential" because the stored produce

is being kept alive and vital, albeit in stasis. That is, the ripening processes are being prevented from proceeding beyond a certain point and may even be reversed under certain circumstances. It will be recognised that the required initial concentration of the solutes in the immersion
5 solution will depend both on the initial condition of the fruit and the fruit type. Whole fruit with an intact outer skin should be used. The advantages of the invention will most readily be recognised when whole fresh fruit is used. In addition to the desirable outcomes already described, new characteristics can be imparted on the stored produce.
10 For example, the storage solutions may be flavoured; the outer skin of the fruit may be tenderised; or the fruit may be carbonated to provide a novel taste sensation and preferred mouth-feel when consumed.

The invention will now be described by way of example only. It will be
15 recognised by those skilled in the art that once the advantages of immersing whole fruit in storage solutions with a view to establishing a neutral water potential (as defined and described herein) are recognised the preparation of moderately hypotonic to substantially isotonic solutions for the storage of a range of whole fruit can readily be
20 determined for different fruit types. Furthermore, the extension of similar principles to the storage of diced harvested produce is contemplated. In this latter case the contribution of the peel or skin to establishing the neutral water potential is discounted.

25 Fresh harvested fruit are preferably surface sterilised prior to immersion in the storage solution using a sodium hypochlorite solution or any of a number of commercially available sanitizers. Depending on the storage and shelf life requirements of the packaged beverage the storage solution may optionally contain a compatible preservative as an
30 alternative or supplement to filter sterilisation. Such preservatives may include dimethyl dicarbonate (VELCORIN™), potassium sorbate, sorbic acid (E200), potassium sorbate (E202), benzoic acid (E210), sodium benzoate (E211), ethyl 4-hydroxy benzoate (E214), ethyl parahydroxybenzoate, sodium sulphite (E221), sodium metabisulphite (E223), malic acid (E296),
35 carbon dioxide (E290), lactic acid (E270). In addition, the artificial sweetener SUCARYL™ contains 0.1% of the preservative benzoic acid. An absence of microbial growth has been observed in the packaged beverages when a storage solution containing polyols and artificial sweeteners is prepared with unsterilized water and the whole fruit has not been surface
40 sterilised. Artificial sweeteners may be used in the storage solution

- and are particularly favoured for use as ingredients in conjunction with polyols. Sorbitol is useful in solutions with artificial sweeteners to remove the bitter after taste sometimes associated with these products (Merck Index 12th Ed). In addition to SUCARYL™ (Abbott) (sodium cyclamate 8% (w/v) (952), sodium saccharin 0.8% (w/v) (954), benzoic acid 0.1% (210)) artificial sweetners include EQUAL™ (Merisant) (5% Benzoic acid (210), Potassium benzoate (212)) and SUGORMAX™ (Hansells) (16% sodium cyclamate, 4% saccharin, malic acid, preservatives (211, 202)).
- 10 When preparing a packaged beverage, whole fruit is placed in a container which is slightly larger than the fruit. For example, a 160 gm apple placed in such a container would require approx 170 ml of storage solution to cover the fruit completely. As noted already, the composition of the solution is determined both by the fruit type and
- 15 desired outcome. These determinations can be made as outlined in the examples. The container is then sealed. Fruit placed in the solution may be stored at ambient temperatures around 20 °C. The shelf life is increased by storing below 20 °C preferably below 10 °C. The fruit is preferably stored above 0°C to prevent freezing. An extended shelf-life
- 20 may be pursued by the inclusion of preservatives in the storage solution, but is not essential to all embodiments. For carbonated fruit the solution is charged with carbon dioxide prior to immersing the fruit in the storage solution. A releasably sealed gas tight container is required to keep the gas in solution. The outer skin or peel of the stored fruit
- 25 will often rupture once the container is opened due to the release of gaseous pressure. This is to be distinguished from the rupturing of the peel or skin that may occur if a neutral water potential is not established. The fruit is typically ready to eat with enhanced characteristics within five days of packing and will store for up to
- 30 three months depending upon storage temperature, fruit type and composition of the storage solution.

- It will be noted that the method and packaged beverage of the invention is distinguished from the traditional French method of preparing *eau de*
- 35 *vie de poire* in that the method of the invention uses produce that has been harvested before being placed in a container to be releasably sealed. In the traditional French method the whole fruit (pear) is grown in the container (bottle) before it is harvested. The method and packaged beverage of the invention is also distinguished from known
- 40 beverages, e.g. fruit juices and fruit floats, purporting to contain

"fruit pieces" in that these fruit pieces are neither whole fruit nor diced fruit. In these known beverages the "fruit pieces" are portions of the flesh of the fruit arising from crushing or maceration of the whole fruit, as opposed to dicing. It will be recognised that when the flesh of whole produce is diced it retains a structural integrity and texture of the flesh of the whole produce absent from what is more accurately described as "fruit pulp". The whole produce that may be diced and used in accordance with the method of the invention includes the tubers, stems, roots etc. of vegetables. When diced, this produce will retain its structure in solution, even when the solution is carbonated. Examples of suitable produce include ginger, turmeric, ginseng, carrot and, parsnip. Greater latitude in the tonicity of the storage solution is permitted when diced vegetables are immersed.

If an alcoholic storage solution is used grappa (triple sec liqueur) made from fermented grape skins, is a favoured addition to the solution. Grappa has been observed to have a particularly good ability to elicit flavours from fruit. Grappa has been used with apples, pears, kiwifruit. Other favoured combinations include grapes with gin, Cointreau (pomace brandy), brandy or vodka; orange with vodka or Cointreau (pomace brandy); lemons with gin; limes with gin or vodka; kiwifruit with whisk(e)y; and pears with brandy, vodka or grappa. These sources of alcohol are typically used at concentrations of 5 to 7.5 % (v/v) depending upon the fruit and total composition of the final storage solution. Caffeine may also be added to a storage solution if desired. When selecting the precise composition of the storage solution it will be recognised that the palatability of the resulting beverage will be a matter of subjective opinion. It is therefore inconsistent with the intent of the description provided in this specification to limit the user to any particular combination of ingredients for use in preparation of the storage solution. The advantages accrue from the establishing a neutral water potential as discussed above and the use of a releasable sealed container that provides the consumer with a convenient and desirable packaged beverage. Several alternative embodiments of the packaged beverage will now be described for the purpose of illustrating, but not limiting the scope of the application of the invention. The use of packaging formats similar in shape and dimension to existing packaging formats facilitates the incorporation of the packaged beverages into existing product lines.

A first embodiment of the packaged beverage is illustrated in Figure 1 of the drawings pages. The figure presents a releasably sealed container (1) similar if not identical in dimension and shape to a conventional drinks can. The container is formed from unitary sidewalls (2) and base (3) sealed with a lid (4). The container (1) is provided with a first releasable seal (5) and a second releasable seal (6) comprised in the lid. In the embodiment illustrated in the Figure the first releasable seal (5) is of the type encountered in a conventional drinks can. Referred to as a releasable seal of the "pop top" type it will be recognised that the releasable seal could be replaced by a releasable seal of the ring pull type or even a screw top or stopper. Convenience and facility of manufacture and container type will influence the selection of the type of first releasable seal. The first releasable seal is a means for providing an opening in the lid of the container that is sufficiently large to permit the egress of the stored solution so that it may be drunk, but not so large, as to permit the egress of the harvested produce (7) contained in the container and initially immersed in the storage solution. The second releasable seal (6) is of the type commonly encountered on cans of meats or vegetables. The second releasable seal (6) comprises a ring (9) that when pulled causes the lid of the container (or at least a substantial portion of the lid of the container) to separate from the side walls (2) of the container to provide a second opening. The second releasable seal is a means for providing an opening that is sufficiently large to allow egress of the produce (7) from the container (1). It will be recognised that types of container with this configuration of seals other than those illustrated may be used in accordance with the methods of the invention. These other types of container might include those of the plastic pouch or cardboard type. It will also be recognised that to satisfy the means for providing an opening that is sufficiently large to allow egress of the produce from the container alternatives to the ring and pull mechanism described and illustrated may be employed. One such mechanism could be for the lid to be a screw top of the container. A configuration including a screw top as the second releasable seal would be particularly suited to situations where the container was to be reusable. Although the illustration presents a configuration of first releasable seal and second releasable seal where the first releasable seal is comprised in the second releasable seal it is contemplated that this need not be the case. However, it will be recognised that the illustrated configuration is particularly appealing to consumers familiar with conventional "pop top"

and can opening means. The sealed container (1) contains a volume of storage solution (8) that is sufficient to ensure the produce (7) is near constantly immersed in the storage solution (8). As the stored solution (8) is only moderately hypotonic to substantially isotonic its density will generally be of a value less than that of the immersed produce. The produce will therefore tend to remain immersed in the stored solution. When a consumer wishes to drink the storage solution it is a simple action to release the first releasable seal (5) by pulling the ring (10) to provide an opening (11) through which the storage solution (8) may be poured (Figure 2-upper left to right). When a consumer wishes to consume the produce it is a simple action to release the second releasable seal (6) by pulling the ring (12) and remove the lid of the container (4) or a substantial portion thereof to provide an opening through which the produce may be removed (Figure 2-lower left to right, Figure 3-upper to lower).

A second embodiment of the invention is similarly illustrated in Figures 9 to 11 of the drawings pages. The Figures present a releasably sealed container (1) of similar dimensions and shape to a conventional drinks bottle. The container is formed from side walls that taper to provide a smaller opening at the top and a larger opening at the base. The container is releasably sealed with a base cap (17) and top cap (18). The base cap (17) may engage with and seal the base open end by means of a screw thread (16). The top cap (18) may engage with and seal the top open end by means of a screw thread (19). In this embodiment the first releasable seal is provided by the cap (18) that may be disengaged from the container by unscrewing. The opening provided by the unscrewing of this first releasable seal is sufficiently large to permit the egress of the storage solution so that it may be drunk by the consumer, but not so large, as to permit the egress of produce (7) contained in the container and initially immersed in the storage solution. Similarly, unscrewing of the base cap (17) that is the second releasable seal provides a second opening that is sufficiently large to allow egress of the produce (7) from the container (1). In this second embodiment of the invention the base cap (17) may serve as a receptacle for the produce (7) once removed from the container as illustrated in Figure 11 of the drawings pages.

Two alternatives of a third embodiment of the invention are illustrated in Figures 12 to 14 of the drawings pages. The figures present a releasably sealed container (1) of the pouch type. The container is

formed from two opposing side walls (2) sealed around their periphery with or without the inclusion of a base wall set between the side walls. In this embodiment the first releasable seal (5) may be a screw cap or a stopper. The first releasable seal is released by unscrewing the cap as
5 illustrated in Figure 13 or removing the stopper. In this embodiment the second releasable seal is provided by tearing open the container as illustrated in Figure 14. The tearing open of the container is facilitated by a nick or pair of nicks in the periphery where the opposing side walls of the container are sealed together and serves as
10 the second releasable seal.

Examples of harvested produce and storage solution combinations for use in the preparation of the packaged beverage are now described. As already noted the palatability of the resulting beverage will be a matter
15 of subjective opinion. In the following examples any notes in respect of palatability are the opinion of a single consumer and are not intended to imply any universal appeal to consumers. The concentrations of solutes are referred to in terms of percent by weight (w/v). The relationship between solute concentration expressed in these terms and Brix reading is
20 provided for specified solutes, but should not be read as inferring a direct correlation. A Brix reading is a convenient and commonly used means of expressing the soluble solids concentration of whole fruit. For determining fruit tonicity there is an acceptable correlation between Brix reading, soluble solids concentration, and tonicity. As the
25 tonicity of a solution is a function of the molar concentration of solutes in the solution there is no universally acceptable correlation between Brix reading, solute concentration expressed in terms of percent by weight, and tonicity where a range of potential solutes with a wide range of different molecular weights and optical activities are used.
30 Concentrations of solutes in the solutions are provided in the following examples in terms of percent by weight and Brix reading for convenience only. In all cases the objective is to employ a solution with a solute concentration that establishes a neutral water potential, generally a solution that is moderately hypotonic or substantially isotonic solution.
35 The methods provided in the examples can be readily adopted to determine the appropriate combinations of solute and solute concentration to be used in a solution for a particular type of harvested produce whetehr it be whole fruit or diced root vegetables. Where column heading are absent the composition of the immersion solutions is provided in the left hand
40 column of each table (except where fruit variety is also identified in

the table). Brief comments on the characteristics of the immersed fruit and immersion solution following storage are provided in the right hand column of each table. It will be appreciated that these characteristics are a subjective determination and the desired characteristics may vary between individuals and regional markets.

Examples 1 to 3

Table 1 below shows the relationship between glycerol concentration and Brix:

Glycerol concentration %(w/v)	Brix reading
1.0	1.5
2.0	2.5
3.0	3.4
4.0	4.0
5.0	5.1
6.0	6.0
7.0	7.0
8.0	8.0
9.0	9.0
10.0	10.0
15.0	14.8
16.0	15.8
17.0	16.9
20.0	19.6
City water	0.2
RO water	0.0

10

Table 2 shows the relationship between calcium chloride concentration and Brix:

Calcium chloride concentration %(w/v)	Brix reading
0.5	1.0
1.0	1.5
1.5	2.4
2.0	2.8
2.5	3.5
3.0	4.2
3.5	4.6
4.0	5.4
4.5	5.7
5.0	6.8

Table 3 shows the relationship between glycerol plus calcium chloride and Brix:

Glycerol %(w/v)	Calcium chloride %(w/v)	Brix reading
1.0	1.5	3.5
1.0	3.0	5.2
1.0	4.5	7.0
2.5	1.5	5.0
2.5	3.0	6.8
2.5	4.5	8.5
5.0	1.5	7.5
5.0	3.0	9.0
5.0	4.5	10.8
7.5	1.5	9.5
7.5	3.0	11.5
7.5	4.5	13.0
10.0	1.5	12.5
10.0	3.0	13.5
10.0	4.5	15.0

- 5 Examples 1 to 3 show that the Brix readings increase with increasing concentrations of glycerol (and other polyhydric alcohols). Addition of calcium chloride and other ions also increases Brix readings.

Example 4

- 10 Braeburn apples purchased from a local supermarket were weighed and placed singly in various solutions and stored for one month at 5°C. At this time the apples were removed from the solutions, dried, weighed, and firmness assessed using a penetrometer.
- 15 The Brix of the fruit at time of storage (control fruit) and following storage, as well as the Brix of solution, were assessed using a portable refractometer. All treatments were replicated 5x and the means are presented in Table 4.

Table 4 shows the effect of solution formulation on weight, firmness and Brix of Braeburn apples following one month's storage at 5°C:

Treatment solution Glycerol/CaCl ₂ /D-glucose % (w/v)	Fruit weight Start/Finish	Soln Brix Start/Finish	Fruit Brix Finish	Firmness Kg/Nm Finish
3.5 0.0 0.0	185 186	4.0 4.0	11.6	7.3
3.5 0.0 1.5	174 176	5.2 5.4	11.7	7.1
3.5 0.0 3.0	180 180	6.6 6.6	11.0	6.9
3.5 1.5 0.0	187 189	5.8 5.8	11.7	7.6
3.5 1.5 1.5	178 179	7.0 6.9	12.4	7.1
3.5 3.0 0.0	187 187	7.4 7.3	11.8	7.6
3.5 3.0 1.5	184 185	8.0 8.3	11.4	7.2
3.5 3.0 3.0	175 175	9.8 10.0	10.7	8.0
3.5 0.0 5.0	181 182	8.0 7.9	12.5	7.1
3.5 0.0 10.0	187 187	12.3 12.3	13.2	6.1
3.5 0.0 20.0	183 184	18.6 18.6	12.6	6.7
Control Apples at Start			12.3	6.5

The results in Table 4 give an insight into the dynamics of fruit in solution. The Brix of the fruit and the Brix of the solution were each maintained during storage. Fruit firmness increased during storage in the solutions, especially in those solutions having lower Brix readings. As there is no significant change in the wet weight of the fruit before (start) and after (finish) immersion the solution must be hypotonic.

Example 5

Red Globe grapes purchased from a local supermarket were stored in various solutions for 20 days at 5°C. The weight loss/weight gain and Brix of the grapes and the solutions were recorded prior to and following storage. Table 5 shows the effect of solution on Red Globe grapes during storage for 20 days at 5°C:

Treatment	Weight change g (mean)	Soln Brix Start/Finish	Fruit Brix Finish
Water	+1.4	0.0 0.3	15.2 split
1% (w/v) glycerol	+0.6	1.5 1.5	17.0
5% (w/v) glycerol	+1.6	5.2 5.4	15.4 split
7% (w/v) glycerol	+1.0	7.3 7.3	16.3
10% (w/v) glycerol	+0.7	10.0 10.0	16.0
15% (w/v) glycerol	+0.1	14.6 15.00	16.8
20% (w/v) glycerol	+0.2	19.4 19.6	15.3
15% (w/v) gly + 1.5% (w/v) CaCl ₂	-0.1	17.0 16.8	16.0
15% (w/v) gly + 3% (w/v) CaCl ₂	-0.2	18.5 18.2	16.6

15% (w/v) gly + 4.5% (w/v) CaCl ₂	-0.5	22.0	22.0	17.0
1% CaCl ₂	+1.1	1.6	2.0	15.4
2.5% CaCl ₂	+1.3	3.4	3.6	14.8
5.0% CaCl ₂	+0.6	6.4	6.4	15.8
Control Grapes				18.0

In water and at low concentrations of glycerol the grapes took up water from the solution and split. As the solution Brix exceeded that of the grapes the fruit lost weight. Solutions having lower to moderate Brix readings were optimal.

Example 6

Braeburn apples picked from the orchard in a slightly overripe condition were stored in a solution of 3.5% glycerol with various ions, sugars and polyhydric alcohols added at concentrations of 1% and 2%. The apples were incubated at 2°C for one month when weight loss/ weight gain, firmness and Brix were measured. Five fruit were incubated per treatment and the means are presented in Table 6. Table 6 shows the influence of solution composition on Braeburn apples during storage at 2°C for one month:

Chemical	Conc. (w/v)	Weight Change (g)	Fruit Brix	Firmness Kg/Nm	Comments
Calcium nitrate	1%	+0.7	15.0	10.0	V.crisp, sour
	2%	+0.8	16.0	10.0	V.crisp, sour
Calcium citrate	1%	+3.0	14.6	8.0	V.crisp, fresh bite
	2%	+2.0	13.4	8.0	Greenish, fresh taste
Calcium gluconate	1%	+0.5	14.0	8.0	Crisp, fresh and sour
	2%	0.0	13.8	9.0	Fresh, clean on palate
KH ₂ PO ₄	1%	+2.3	15.0	8.0	V.crisp, fresh fizz
	2%	+0.7	13.2	9.0	V.crisp, fresh fizz
KH ₂ PO ₄	1%	0.0	13.6	9.0	V.crisp, fresh fizz
	2%	-1.3	12.6	8.5	V.crisp, fresh fizz
Sorbitol	1%	+0.3	14.0	8.0	Sour
	2%	+1.1	13.0	8.0	Crisp, sweet&clean
Mannitol	1%	+1.1	14.0	8.0	Crisp, sweet&sour
	2%	+0.5	12.0	6.8	sour
D-glucose	1%	+1.3	13.0	8.0	Crisp, fresh fizz
	2%	+0.9	13.2	8.0	Crisp, fresh fizz
Inositol	1%	+0.2	12.8	8.0	Fresh, clean on palate
	2%	+0.4	12.6	7.0	Green, soft, fresh
MgSO ₄	1%	+0.7	12.8	7.5	Fresh, crisp, clean
	2%	-0.3	13.0	8.2	Fresh, crisp, green
Control			14.0	6.8	Sweet, slightly soft

The data in Table 6 show how the formulation of the storage solution affects the Brix, firmness and flavor of Braeburn apples. Where polyhydric alcohols are the solutes lower concentrations are favoured.

- 5 Braeburn apples stored for one month in solutions of 3.5% Glycerol plus 1 and 2% solutions of various salts and sugars were hypotonic and kept the fruit firm and crisp. Solutions of 3.5% Glycerol plus 2% KH_2PO_4 and 2% MgSO_4 appeared to be hypertonic whilst 2% calcium gluconate and 1% KH_2PO_4 appeared to be isotonic. Solutions of 3.5% glycerol plus various
- 10 salts/sugars are appear to be predominantly hypotonic for the storage of Braeburn apples.

Example 7

- Braeburn apples were stored in a mixture of glycerol, mannitol, sorbitol
- 15 and propylene glycol with and without calcium chloride. The fruit were stored at 2°C in the solutions for one month. Weight loss/gain, firmness, Brix and flavor attributes were assessed. All treatments were replicated five times. Table 7 shows the influence of solution composition on Braeburn apples during storage at 2°C for one month:

Concentration of each of the polyhydric alcohols (w/v)	Concentration Of CaCl_2 (w/v)	Weight Change (g)	Fruit Brix	Firmness Kg/Nm	Comments
0.5%	0%	+3.0	9.6	7.7	Crisp, green, sour Very sweet
	1.5%	+0.5	14.0	9.0	
0.75%	0%	+5.4	12.0	8.0	Crisp, sweet Crisp, bland
	1.5%	-0.4	13.4	9.0	
1.0%	0%	+3.1	15.6	8.6	Crisp, sweet Crisp, sweet, refreshing
	1.5%	-1.0	12.6	8.5	
1.25%	0%	+1.5	10.6	7.6	Greenish, sour Crisp, sour with bite
	1.5%	-0.8	13.0	7.4	
1.5%	0%	0.0	12.6	8.6	Crisp, green, refreshing Sweet and sour
	1.5%	-1.8	13.6	8.5	

20

- A mixture of polyhydric alcohols (polyols) can be mixed with calcium chloride (CaCl_2) to alter fruit attributes. At all concentrations of polyols without CaCl_2 the apples gained weight consistent with the solutions being moderately hypotonic. Fruit increased overall weight by
- 25 an average of 2.06 g. At the higher concentrations of polyols with the addition of calcium chloride (CaCl_2) the apples lost weight consistent with the solutions being hypertonic. The addition of 1.5 % CaCl_2 to the mixtures of polyhydric alcohols (polyols) at a concentration above 0.5%

made the solution weakly hypertonic and the fruit lost an average 0.7g. As expected CaCl_2 increased fruit firmness (8.5 v 8.1 Kg/m^2). However, this effect ceased as the concentration of the mixture of polyhydric alcohols (polyols) exceeded 1%. The results indicate that the addition of a soluble salt such as CaCl_2 to the mixture of polyhydric alcohols (polyols) can pull water from the apples causing a slight loss of weight (approx. 1.5% overall) and change the tonicity of the storage solution from hypotonic to hypertonic. It also demonstrates the complexity of the relationship between fruit and solutions. The addition of soluble salts to the storage solution which have the capacity to move across cell membranes can readily change the dynamics of the storage solution.

Example 8

Forty overripe Gala apples were purchased from a local supermarket. Fruit had a firmness of 5.8 Kg/Nm and a Brix of 14.2 (mean of 10 fruit).

Twenty fruit were placed in a large plastic container in a solution of 3.5% glycerol, 0.75% calcium chloride and 1% calcium lactate. Air was bubbled into the base of the container using an aquarium pump. The fruit in the solution were stood on the bench at 20°C for 20 days when the fruit were removed from the solution and tested for firmness and Brix. Ten control fruit were stored on the same bench in a plastic bag. Table 8 shows the influence of storage solution and air on storage parameters of Gala apples:

Treatment	Firmness Kg/Nm	Brix of Fruit	Comments
Apples at start of trial	5.8	14.2	Sweet, soft mealy
Apples from solution at end of trial	7.4	12.8	Firm, greener, less sweet
Apples from air at end of trial	5.3	16.0	Sweet, soft mealy

The trial data indicates that storage of apples in a specific solution at ambient temperature with aeration reversed the ripening process and made the fruit firmer and less ripe. Apples in solution gained weight as indicated by increasing firmness of the cell walls and the hypotonic characteristics of the solution. Apples stored in air continued to lose weight presumably as a consequence of the cell walls losing their integrity and the fruit further ripening. The lack of oxygen as a result of immersion in the storage solution is anticipated to have slowed the

metabolism of ripening and evolution of ethylene. The calcium ions have the potential to have induced cell repair.

Example 9

- 5 Table 9 shows the interactions of Braeburn apples and storage media following storage for 7 days at 3 °C:

	% Weight Change	Brix Soln At Start	Brix Soln At End	Brix Fruit At End
Water Control	+0.12%	0.0	0.0	10.3
Glycerol (w/v)				
2.5%	-0.37%	1.4	1.3	11.0
5.0%	+0.09%	3.6	4.0	10.4
10.0%	-0.03%	7.0	7.0	10.0
20.0%	+0.03%	14.6	14.4	9.0
40.0%	-0.31%	30.0	27.0	11.0
SUCARYL™ (w/v) *				
2.5%	+0.18%	0.0	0.0	11.4
5.0%	+0.15%	0.0	0.0	9.2
10.0%	+0.10%	0.0	0.5	10.0
20.0%	+0.17%	1.2	1.2	10.0
40.0%	+0.18%	2.6	2.8	10.0
D-glucose (w/v)				
2.5%	+0.09%	1.6	1.8	9.8
5.0%	+0.04%	4.2	4.5	10.2
10.0%	0.08%	8.5	8.8	10.0
20.0%	0.02%	16.2	16.4	11.2
40.0%	-0.16%	28.0	27.0	11.4
Air Control	-0.16%	---	----	10.0

* SUCARYL™ (sodium cyclamate 8% w/v, sodium saccharin 0.8% w/v, benzoic acid 0.1% w/v).

10

Braeburn apples exhibited small changes in weight regardless of the solute type and solute concentration. The Brix of the solution showed little change during storage as did the Brix of the apple. Weight changes in sucaryl were consistent irrespective of concentration.

15

Example 10

Table 10a shows the interactions of Red Globe grapes and storage media following storage for 7 days at 3°C:

	% Weight Change	Brix Soln At Start	Brix Soln At End	Brix Fruit At End
Water Control	+9.0%	0.0	0.0	14.8
Glycerol (w/v)				
2.5%	+11.1	1.4	2.2	15.0
5.0%	+8.4%	3.6	5.0	15.6
10.0%	+3.4%	7.0	9.4	15.8
20.0%	-2.9%	14.6	17.2	15.4
40.0%	-11.3%	30.0	28.6	18.6 wrinkled
Sucaryl (w/v)				
2.5%	+9.4%	0.0	0.0	11.4
5.0%	+16.4%	0.0	1.2	9.2 small split
10.0%	+12.8%	0.0	2.8	10.0 split
20.0%	+10.6%	1.2	3.8	10.0 split
40.0%	+8.1%	2.6	5.0	10.0 split
D-Glucose (w/v)				
2.5%	+12.7%	1.6	3.0	16.5
5.0%	+11.4%	4.2	6.4	14.2
10.0%	+5.8%	8.5	11.2	14.8
20.0%	+0.45%	16.2	24.0	15.6
40.0%	-5.3%	28.0	33.0	15.6 wrinkled
Air Control	-6.5%	---	---	14.5-18.0

- 5 In contrast to Braeburn apples, Red Globe grapes exhibited large gains/losses in weight with solute and solute concentration. Grapes stored in water gained weight. In glycerol the grapes gained less weight as the concentration approached 10 % then lost weight. At 40 % the grapes became wrinkled. In SUCARYL™ at higher concentrations (10 % and above)
- 10 the grapes gained water and split making the data unreliable. The splitting caused the Brix of the solution to increase as material exited fruit. In D-glucose the weight gain decreased as solute concentration increased, reaching equilibrium at a concentration slightly above 20 %.
- 15 At 40 % the grapes lost weight and became wrinkled. In glycerol and in D-glucose the Brix of the solution increased following storage. Table 10b

shows the interactions of Red Globe grapes and storage solutions on storage for 20 days at 5 °C:

	Weight at start (g)	Weight at end (g)	Change in weight (g)	Brix (solution at end)	Brix (fruit at end)
Glycerol (w/v)					
Water	11.30	12.86	+1.56g	0.0	14.62
2.5%	12.82	14.25	+1.43g	1.4	14.25
5.0%	13.72	14.87	+1.15	3.6	15.8
10.0%	12.58	13.01	+0.43	7.0	15.8
20.0%	15.33	14.89	-0.44	14.6	15.4
40.0%	14.02	12.43	-1.59	30.0	18.6
Sucaryl (w/v)					
Water	17.67	18.98	+1.31g	0.0	15.60
2.5%	17.50	19.15	+1.65g	0.0	15.40
5.0%	11.79	13.73	+1.94	0.0	14.0
10.0%	13.52	15.52	+2.00	0.0	14.4
20.0%	17.30	19.13 split	+1.83	1.2	14.0
40.0%	14.64	15.83 split	+1.19	2.6	15.3
D-Glucose (w/v)					
Water	14.16	15.82	+1.66g	0.0	14.40
2.5%	17.03	19.20	+2.17g	1.6	16.5
5.0%	19.15	21.34	+2.19	4.2	14.2
10.0%	14.58	15.43	+1.34	8.5	14.8
20.0%	15.43	15.50 float	+0.07	16.2	15.6
40.0%	20.09	19.02 float	-1.88	28.0	15.6
Air	14.28	13.34	-0.94	0.0	18.4

Three Red Globe grapes were placed in solutions of 10 % glycerol to which were added various concentrations of CaCl₂ and NaCl. The fruit were stored at 5 °C for 7 days when they were dried and weighed and the Brix of the storage solution and the grapes determined. The object of the experiment was to determine the tonicity of the various solutions.

Treatment 10% Glycerol plus CaCl ₂ /NaCl	Wgt (g) start	Wgt (g) finish	Difference (g)	Brix soln	Brix grapes
10% Glycerol	41.8	42.9	1.1	8.6	16.4
0.25% CaCl ₂	35.1	36	0.9	9	16
0.5% CaCl ₂	33.4	34.06	0.7	9	17
1% CaCl ₂	33.9	34.7	0.8	9.2	16.8
2% CaCl ₂	34.2	35.0	0.8	9	16.5
0.25% NaCl	49.3	50.3	1.0	8.6	17.3
0.5% NaCl	34.16	35.16	1.0	9	15
1% NaCl	40.6	41.3	0.7	9.6	16
1.5% NaCl	43.5	44.5	1.0	8.4	15
2% NaCl	37.4	38.2	0.8	10.6	14.2
0.25% NaCl/0.25% CaCl ₂	45.5	46.4	0.9	9	16.6
0.5% NaCl/0.5% CaCl ₂	32.5	33.3	0.8	9.4	16.6
0.75% NaCl/0.25% CaCl ₂	43.7	43.9	0.2	9.6	16.6
0.25% NaCl/0.75% CaCl ₂	37.8	38.5	0.7	9.6	17.2
Mean			0.8	9.2	16.2

Red Globe grapes stored for 7 days in solutions of 10 % glycerol plus various concentrations of CaCl₂ and NaCl and mixtures thereof gained on average 0.8 g per three fruit. Hence, the storage solutions were moderately hypotonic and kept the fruit firm. The differential in Brix between the grapes and the storage solution was maintained possibly because of the tonicity of the 10 % glycerol solution.

10 Example 11

Table 11 shows how solution composition can affect the flavour and textural attributes of Nashi pear and apples following storage for 30 days at 5°C:

Solution	Nashi Pear	Pacific Rose Apple	Braeburn Apple	Granny Smith Apple
1.3 % SUCARYL™* Glycerol Propylene glycol 1 % CaCl ₂	Very sweet, nice taste and texture	Sweet, skin tough and chewy	Sour, crisp, bite	Sweet and sour
3 % Glycerol 1 % SUCARYL™* 1 % CaCl ₂	Tastes like fresh Nashi, wooden skin	Refreshing taste, skin not obvious	Sour, soft	Crisp, sweet refreshing
3 % Propylene glycol 1 % Glycerol 1 % CaCl ₂	Very sweet, nice taste and texture	Bland, skin tough	Sweet, skin tough	Sour, bland
3 % SUCARYL™* 1 % Glycerol	Sweet, excellent	Crisp, nice flavour, skin	Crisp, refreshing,	Rubbery, bland, soft

1 % CaCl ₂	taste and texture	not obvious	nice	
3 % SUCARYL™ * 1 % propylene glycol 1 % CaCl ₂	Sweet, nice taste and texture, aromatic	Too sweet, skin tough and chewy	Sour, soft and mushy	Sour, soft and mushy

* SUCARYL™ (sodium cyclamate 8% w/v, sodium saccharin 0.8% w/v, benzoic acid 0.1% w/v).

- 5 The observations in Table 11 show how variations in solution composition can alter flavour and textural attributes of fruit. The results obtained for a particular fruit and solution combination were consistent and repeatable.

10 **Example 12**

Zespri Gold and Haywood Green Kiwifruit were placed in solutions which were intended for drinking along with consumption of the fruit. These solutions can also be carbonated and have alcohol added depending upon the desired product. Prior to placement in the solutions the fruit were
 15 rinsed in filtered tap water. The water for the solutions was also tap water. Fruit in solutions were kept at 5 to 6°C for 30 days prior to sampling.

4% Sucaryl + 1% Sorbitol	Fruit and drink taste nice.
3% Sucaryl + 2% Glycerol	Fruit and drink taste nice
3.5% Sucaryl + 1.5% Glycerol	Fruit and drink taste nice
2.5% Sucaryl + 3% Glycerol	Fruit and drink taste nice
2.5% Sucaryl + 2.5% Glycerol	Fruit and drink taste nice
4% Sucaryl + 1% Glycerol	Fruit and drink taste nice
6% Sucaryl + 2% Glycerol	Too sweet/sour
4% Sucaryl + 1% Glycerol + 7.5% Grants Whisky	Drink nice, smoky, fruit good flavor
4% Sucaryl + 1% Glycerol + 7.5% Bourbon	Drink nice, fruit good flavor
3.5% Equal + 1% Glycerol	Drink sour. Fruit tart but nice
1.75% Sugromax	Drink and fruit nice
4% Sucaryl + 1% Glycerol + 1% D-Glucose + 0.5% NaCl	Drink too sweet fruit OK
Green 3.5% Sucaryl + 1% Glycerol	Drink and fruit nice
+ 0.5% Ascorbic acid	Nice drink and fruit with bite
+ 7.5% Brandy	As above
+ 7.5% Gin	As above

+ 7.5% Grappa	Drink whisky like. Fruit nice sharp taste.
Gold. 3% Sucaryl + 2% Glycerol + 2% Propylene Glycol + 1% D-Glucose	Sweet but nice
+ 0.5% Ascorbic acid	Drink sharp taste, fruit sweet
+ 7.5% Gin	Both drink and fruit nice flavor
+ 7.5% Grappa	V nice drink and fruit.
3.5% Sucaryl + 1% Glycerol + 7.5% Rum Gold	Both drink and fruit nice flavor
4% Sucaryl + 3% Glycerol + 3% Propylene Glycol + 1% D-glucose	Drink nice. Fruit sweet with zing
+ 7.5% Brandy	Drink and fruit nice.
+ 7.5% Cointreau	Drink whisky like .fruit with zing
5% Glycerol + 2.5% Sucaryl + 0.5% NaCl + 0.5% CaCl	Drink strange flavor. Fruit sour, awful
3% Sucaryl + 1% Glycerol	Drink and fruit very nice
3.5% Sucaryl + 5% Glycerol	Drink aromatic flavor. Fruit nice
1.5% Sucaryl + 1.5% Glycerol + 1.5% Propylene Glycol	Drink sour. Fruit good taste
2% Sucaryl + 3% Glycerol + 2% Propylene Glycol + 1% D-glucose	Drink strange flavor. Fruit nice esp. Gold.
7.5% Glycerol + 1% NaCl	Nice sweet/sour drink and fruit
3% Sucaryl + 2% Glycerol + 2% PropyleneGlycol + 1% D-glucose.	Very nice drink and fruit
6% Sucaryl + 2% Glycerol + o.	Drink strange flavor
2% Sucaryl + 1.5% Glycerol + 1.5% PropyleneGlycol + 2% D-glucose	Fruit sweet/sour nice
Green. 5% Glycerol + 2.5% Sucaryl + 1% D-glucose	Too sour
Green. 7.5% Glycerol + 1% D-glucose	Fruit nice, drink sweet
4% Glycerol + 3% Sucaryl + 3% PropyleneGlycol + 1% NaCl	Drink and fruit nice(hint salty)
4% Glycerol + 3% Sucaryl + 3% PropyleneGlycol + 2% D-Glucose + 1% NaCl	As above.
3.5% Glycerol + 1.5% D-Glucose	Drink not nice. Fruit nice
2.5% Sucaryl + 5% PropyleneGlycol + 0.5% NaCl + 0.5% CaCl ₂	Drink not nice. Fruit nice.
2% Glycerol + 1.5% Sucaryl + 1.5% PropyleneGlycol + 0.5% NaCl + 0.5% CaCl ₂	Fruit nice
5% Glycerol + 1% NaCl + 0.5% Citric acid + 0.5% K ₂ HPO ₄ + 2.5% D-Glucose	Drink ok. .Fruit bitter after taste.
5% Glycerol + 5% D-Glucose + 0.5% Citric acid + 1% K ₂ HPO ₄	Drink ok. Fruit too sweet.

Example 13

Red, green and black table grapes can be carbonated and alcohol added depending upon the desired product. Fruit were washed and treated as detailed above for kiwifruit.

5

10.5% Glycerol + 1.5% Sorbitol + 1% CaCl_2	Fruit and drink excellent.
5% Glycerol + 5% D-Glucose + 0.5% Citric acid + 1% K_2HPO_4 + 1% CaCl_2	Fruit and drink excellent.
10.5% Glycerol + 2% Sorbitol	Fruit and drink excellent
8% Sucaryl + 2% Glycerol + 2% Sorbitol	Fruit and drink excellent
4.5% Sucaryl + 3% Glycerol + 2% Sorbitol	Fruit and drink excellent
6% Sucaryl + 4% Glycerol + 2% Sorbitol	Fruit and drink excellent
5% Sucaryl + 5% Glycerol + 1% Sorbitol	Fruit and drink excellent
3.3% each Sorbitol, Sucaryl & Glycerol	Fruit and drink excellent
6% Sucaryl + 4% Sorbitol	Fruit and drink excellent
6% Sucaryl + 4% Sorbitol + 1% Glycerol	Fruit and drink excellent
10.5% Glycerol + 1% D-Glucose	Drink bland. Fruit crisp excellent
+ 7.5% Gin	Drink like gin & water. Fruit firm excellent
+ 7.5% Vodka	Drink bland. Fruit firm nice
+ 7.5% Brandy	Drink like Brandy & Water. Fruit firm nice
+ 7.5% Cointreau	Drink bland, sour. Fruit sweet, bitter
10.5% Glycerol + 1% CaCl_2	Drink sour. Fruit crisp sweet
+ 7.5% Gin	Drink bitter. Fruit nice
+ 7.5% Vodka	Drink v bitter. Fruit nice
+ 7.5% Brandy	Drink vv bitter. Fruit nice
+ 7.5% Cointreau	Drink vv bitter. Fruit sweet nice
3% Glycerol + 2% Sucaryl + 2% Propylene Glycol + 1% D-Glucose	Drink tastes alcoholic. Fruit split.
+ + 7.5% Gin	Drink excellent. Fruit excellent
+ 7.5% Vodka	Drink excellent. Fruit outstanding
+ 7.5% Brandy	Drink excellent. Fruit outstanding
+ 7.5% Cointreau	Drink excellent. Fruit excellent

Looking at CaCl_2 and NaCl effects in association with 10 % glycerol.

+ 1% CaCl_2	Drink unsuitable. Fruit firm excellent
+ 1% NaCl	Drink unsuitable. Fruit sweet
+ 0.25% NaCl + 0.75% CaCl_2	Drink unsuitable. Fruit sweet, astringent
+ 0.5% NaCl + 0.5% CaCl_2	Drink unsuitable. Fruit sweet

+ 0.75% NaCl + 0.25% CaCl ₂	Drink unsuitable. Fruit sweet
+ 0.5% CaCl ₂	Drink unsuitable. Fruit sweet
+ 0.5% NaCl	Drink unsuitable. Fruit very firm, sweet
+ 0.25% NaCl + 0.25% CaCl ₂	Drink unsuitable. Fruit firm sweet
+ 0 Ca & Na	Drink unsuitable. Fruit chewy
+ 1.5% NaCl	Drink unsuitable. Fruit chewy
+ 2% NaCl	Drink unsuitable. Fruit chewy, astringent
12.5% Glycerol	Drink bland. Fruit crisp sweet
+ 1.5% CaCl ₂	Drink unsuitable. Fruit v crisp nice
+ 3% CaCl ₂	Drink unsuitable. Fruit firm crisp
+ 4.5% CaCl ₂	Drink unsuitable. Fruit soft little flavor
15% Glycerol	Drink unsuitable. Fruit OK
15% Glycerol + 1.5% CaCl ₂	Drink unsuitable. Fruit crisp sweet
2.5% ea Glycerol + mannitol + sorbitol + propylene glycol + 1.5% CaCl ₂	Drink unsuitable. Fruit firm sweet
12.5% Propylene glycol	Drink unsuitable. Fruit firm slightly sour
12.5% Sorbitol	Drink unsuitable. Fruit firm, sweet
10.5% Glycerol	Drink unsuitable. Fruit firm sweet
+ 1.5% Ca lactate	Drink unsuitable. Fruit crisp, chewy, sour
+ 1.5% Ca nitrate	Drink unsuitable. Fruit crisp, nice
+ 1.5% Ca citrate	Drink unsuitable. Fruit crisp, refreshing
+ 1.5% D-Glucose	Drink unsuitable. Fruit crisp, refreshing
+ 1.5% Fructose	Drink unsuitable. Fruit crisp, refreshing
+ 1.5% MgSO ₄	Drink unsuitable. Fruit crisp, sweet
+ 1.5% Sorbitol	Drink unsuitable. Fruit crisp, nice
+ 1.5% K ₂ HPO ₄	Drink unsuitable. Fruit firm, crisp, nice
+ 1.5% KH ₂ PO ₄	Drink unsuitable. Fruit firm, crisp refreshing
+ 1.5% Tartaric acid	Drink unsuitable. Soft, watersoaked, strange taste
+ 1.5% Citric acid	Drink unsuitable. Fruit firm, sweet
+ 1.5% Malic acid	Drink unsuitable. Fruit firm sweet raison taste
+ 1.5% Galactose	Drink unsuitable. Fruit firm nice taste
+ 3.0% Fructose	Drink unsuitable. Fruit firm, crisp, nice

Example 14

Root ginger is washed then sliced vertically into sections 1-2 cm long

and placed in solutions. Carbonation helps the extraction of flavor especially when the container is opened. This makes a refreshing drink and the ginger is not consumed.

4% Sucaryl + 1% Sorbitol	Drink nice
3% Sucaryl + 2% Glycerol	Drink nice
3.5% Sucaryl + 1.5% Glycerol	Drink nice
2.5% Sucaryl + 3% Glycerol	Drink nice
2.5% Sucaryl + 2.5% Glycerol	Drink nice
4% Sucaryl + 1% Glycerol	Drink nice

5

Example 15

Packaged beverages including citrus are designed to enable the citrus oils from the skin to diffuse into solutions to make a natural flavored drink. The solutions may be carbonated or supplemented with alcohol or both. The solutions enter the fruit making it sweet and suitable for eating. Because of the structure of citrus fruit, in that the skin is discrete from the inner segments, the principles governing the movement of solutes and water across membranes outlined in the detailed description do not apply. Therefore concentrations of solutes for suspension of the fruit do not necessarily reflect the Brix of the fruit concentrations. Solutions are therefore tailored to extract maximum flavor from the skin.

15

<i>Lemons & Limes</i>	
3% Sucaryl + 3% Sorbitol + 1% Glycerol	Fruit and drink excellent
4% Sucaryl + 1% Sorbitol	Fruit and drink excellent
4% Sucaryl + 1% glycerol + 1% Sorbitol	Fruit and drink excellent
3.5% Sucaryl + 1.5% Glycerol	Fruit and drink hint sour
3% Sucaryl + 2% Glycerol	Fruit and drink excellent
2.5% Sucaryl + 3% Glycerol	Fruit and drink sharp taste
2.5% Sucaryl + 2.5% Glycerol	Fruit and drink excellent
4% Sucaryl + 1% Glycerol	Fruit and drink excellent
+ 7.5% Gin	Drink excellent. Fruit sweet
+ 7.5% Cointreau	Fruit and drink excellent
+ 7.5% Vodka	Fruit and drink excellent
4% Sucaryl + 3% Glycerol + 3% Propylene Glycol + 1% D-Glucose	Drink hint sour, fruit sweet
+ 7.5% Vodka	Fruit and drink excellent
3.5% Sucaryl + 5% Glycerol	Fruit and drink excellent
+ 7.5% Gin	Fruit and drink excellent some bite

4% Sucaryl + 1% Glycerol + 10% Vodka.	Drink and Fruit hint sour
2% Sucaryl + 1.5% Glycerol + 1.5% PropyleneGlycol + 2% D-Glucose	Fruit and drink sour
+ 7.5% Gin	Fruit and drink sour
3% Sucaryl + 1% Glycerol	Fruit and drink excellent
+ 7.5% Gin	Fruit and drink excellent with bite
1.5% Sucaryl + glycerol + propylene Glycol	Like lemon/lime water, fruit nice
+ 7.5% Gin	Drink sour, fruit bitter
3% Glycerol + 2% Sucaryl + 2% PropyleneGlycol + 1% D-Glucose	Drink poor, fruit sour
+ 7.5% Gin	Drink like lemon water, fruit sour
7.5% Glycerol + 1% NaCl	Strange drink and fruit flavor
+ 7.5% Gin	As above
4% Glycerol + 3% Sucaryl + 3% Propylene Glycol + 1% D-Glucose	Bitter drink and fruit.
+ 7.5% Gin	Too sour
2% Glycerol + 1.5% Sucaryl + 1.5% Propylene Glycol + 2% D-Glucose	Fruit and drink nice
+ 10% Gin	Fruit and drink nice
+ 1% NaCl	Drink salty, fruit vv sour
+ 1% CaCl	As above
+ 0.5% NaCl + 0.5% CaCl	Drink hint salt, fruit glassy

Oranges	
5% Glycerol + 0.5% CaCl ₂ + 0.5% NaCl	Drink unsuitable. Fruit excellent
3% Glycerol + 1% Prop.Gly + 1% Sucaryl + 0.5% CaCl ₂ + 0.5% NaCl	Drink unsuitable. Fruit sharp, nice flavor
2% Glycerol + 1.5% Prop.Gly + 1.5% Sucaryl + 0.5% CaCl ₂ + 0.5% NaCl	As above
3% Glycerol + 2% Sucaryl	Drink weak flavor. Fruit as above
3% Glycerol + 2% Sucaryl + 1% CaCl ₂	Drink sour, fruit excellent
3% Glycerol + 2% Sucaryl + 1% NaCl	Drink sour. Fruit easy peel, not as sweet
3% Glycerol + 2% Sucaryl + 0.5% NaCl + 0.5% CaCl ₂	As above
5% Glycerol + 0.5% NaCl + 0.5% CaCl ₂ + 4% Vodka	Fluid sour, fruit sour like grapefruit
3% Glycerol + 2% Sucaryl + 0.5% NaCl + 0.5% CaCl ₂ + 4% Vodka.	Drink sweet, strong orange. Fruit excellent
2% Glycerol + 2% Sucaryl + 2% D-Glucose + 7.5% Vodka	Fruit and drink excellent
+ 10% Vodka	As above, more zing
2% Glycerol + 1.5% Sucaryl + 1.5% Prop.Gly + 2% D-Glucose + 7.5% Vodka	As above hint sweeter

+ 10% Vodka	As above, more zing
2% Glycerol + 1.5% Sucaryl + 1.5% Prop.Gly + 2% D-Glucose + 1% NaCl + 7.5% Vodka	Drink hint salty, fruit nice bite
2% Glycerol + 1.5% Sucaryl + 1.5% Prop.Gly + 2% D-Glucose + 1% CaCl ₂ + 7.5% Vodka	Drink yellow, bitter, grapefruit like, fruit sweet/sour
2% Glycerol + 1.5% Sucaryl + 1.5% Prop.Gly + 2% D-Glucose + 0.5% CaCl ₂ + 0.5% NaCl	
+ 7.5% Vodka	Drink too sweet, hint sour. Fruit nice
2% Glycerol + 1.5% Sucaryl + 1.5% Prop.Gly + 2% D-Glucose + 15% Vodka	Drink and fruit too strong
1.5 % Glycerol + 1.5% Sucaryl + 1.5% Prop.Gly + 1.5% D-Glucose + 10% Vodka	Drink hint grapefruit. Fruit bland
2% Glycerol + 1.5% Sucaryl + 1.5% Prop.Gly + 2% D-Glucose + 10% Cointreau.	Drink and fruit excellent
2% Glycerol + 1.5% Sucaryl + 1.5% Prop.Gly + 2% D-Glucose + 0.5% NaCl + 10% Cointreau	Drink nice, hint of salt, fruit excellent
2% Glycerol + 1.5% Sucaryl + 1.5% Prop.Gly + 2% D-Glucose + 0.5% NaCl +	
+ 0.5% CaCl ₂ + 10% Cointreau	Drink nice, hint salt, fruit excellent (need 0.15% Na/Ca).
3% Sucaryl + 3% Sorbitol + 1% Glycerol	Fruit and drink excellent
4% Sucaryl + 1% Sorbitol	Fruit and drink excellent
4% Sucaryl + 1% glycerol + 1% Sorbitol	Fruit and drink excellent
4% Sucaryl + 1% Glycerol	Fruit and drink excellent

Mandarins

4% Sucaryl + 1% glycerol + 1% Sorbitol	Fruit and drink nice
4% Sucaryl + 1% glycerol	Fruit and drink nice, hint sour

Example 16

- Apples and pears store well in solutions and can be manipulated to express different flavors. Each variety exhibits a different response (drink and fruit flavor) to a solution. Specific solutions have been developed for individual varieties and the particular flavor and texture sought. Indicative results from the trial of a sample of pip fruit is given below. European and Nashi pears are quite different and require different treatments.

<i>Packham Pears</i>	
3.5% Glycerol	Drink bland. Fruit crisp, bland
3.5% Glycerol + 1% CaCl_2	Drink sour. Fruit crisp, nice flavor
3.5% Glycerol + 1.5% CaCl_2	Drink sour. Fruit crisp, surface 20% brown
5% Glycerol	Drink bland. Fruit v green, bland
5% Glycerol + 1% CaCl_2	Drink sour. Fruit v sweet, sour. Surface 75% brown
5% Glycerol + 1.5% CaCl_2	Drink sour. Fruit sour, surface brown
7% Glycerol	Drink sweet. Fruit v sweet
7% Glycerol + 1% CaCl_2	Drink bland. Fruit green, bland
7% Glycerol + 1.5% CaCl_2	Drink sour. Fruit green bland
1.25% Glycerol + mannitol + sorbitol + prop.gly	Drink bland. Fruit green, sweet/sour
1.25% Glycerol + mannitol + sorbitol + prop.gly + 1% CaCl_2	Drink sour. Fruit crisp, nice taste
4.5% Mannitol	Drink sweet. Fruit crisp, nice
4.5% Mannitol + 1% CaCl_2	Drink bland. Fruit sweet, nice
4.5% Sorbitol	Drink sweet. Fruit fizz, good taste
4.5% Sorbitol + 1% CaCl_2	Drink bland. Fruit nice taste, surface brown
4.5% Propylene Glycol	Drink sour. Fruit water soaked.
4.5% Propylene Glycol + 1% CaCl_2	Drink sour. Fruit sweet/sour, awful
4.5% Glycerol + 1% Ca nitrate	Drink sour. Fruit crisp, green
4.5% Glycerol + 1% D-Glucose	Drink sweet. Fruit soft, sweet
3% Sucaryl + 1% Glycerol + 5% Grappa	Fruit and drink excellent
1.5% Glycerol + 1.5% propylene glycol + 1.5% Sucaryl + 5% Grappa	Fruit and drink excellent
4% Sucaryl + 1% Glycerol + 5% Grappa	Fruit and drink excellent
1.5% Glycerol + 1.5% propylene glycol + 1.5% Sucaryl + 7.5% Grappa	Better than 21
7.5% Glycerol	Drink non descript. Fruit sweet
5.5% Glycerol + 1% CaCl_2	Drink sour. Fruit firm
5.5% Glycerol + 1% NaCl	Drink sour. Fruit green fizz, nice
5.5% Glycerol + 0.5% NaCl/ CaCl_2	Drink non descript. Fruit green, nice
1.5% Glycerol + prop.glycol + Sucaryl	Drink nice alcohol taste. Fruit firm, nice
1.5% Glycerol + prop.glycol + Sucaryl + 1% D-glucose	As above, fruit firmer
3% Sucaryl + 1.5% Glycerol	Drink and fruit nice
3% Glycerol + 1% CaCl_2 + 0.5% Citric acid + 1% K_2HPO_4 + 1% Sucaryl	Drink sour. Fruit firm with bite
5.5% Glycerol + 7.5% Vodka	Drink sour. Fruit firm, sour
5.5% Glycerol + 7.5% Brandy	Drink sour. Fruit ok

4% Sucaryl + 1% Glycerol	Fruit and drink nice
4% Sucaryl + 1% Glycerol + 10% Brandy	Drink and fruit nice.
4% Sucaryl + 1% Glycerol + 10% Vodka	Drink and fruit nice
4% Sucaryl + 1% Glycerol + 7.5% Grappa	Drink and fruit nice

<i>Nashi Pears</i>	
3% Sucaryl + 1% Glycerol + 2.5% Grappa	Drink and fruit very nice
3% Sucaryl + 1% Glycerol + 5.0% Grappa	Drink and fruit very nice
3% Sucaryl + 1% Glycerol	Drink and fruit very nice
5% Glycerol + 1% CaCl ₂	Drink sour. Fruit bland
3% Glycerol + 2% Sucaryl + 1% CaCl ₂	Drink bland. Fruit bland
3% Glycerol + 2% Sucaryl + 1% NaCl	Drink bland. Fruit soft
3% Glycerol + 2% Sucaryl + 0.5% NaCl + 0.5% CaCl ₂	Drink bland. Fruit fresh clean taste
3% Glycerol + 0.5% NaCl + 0.5% CaCl ₂	Drink bland. Fruit fresh clean taste
5% Glycerol + 0.5% NaCl + 0.5% CaCl ₂	Drink bland. Fruit fresh clean taste
3% Glycerol + 1.5% Sucaryl + 1.5% Prop.gly + 1% CaCl ₂	Drink bland. Fruit crisp v.nice
3% Glycerol + 1.5% Sucaryl + 1.5% Prop.gly + 1% NaCl	Drink bland. Fruit crisp v.nice
3% Glycerol + 1.5% Sucaryl + 1.5% Prop.gly + 0.5% NaCl + 0.5% CaCl ₂	Drink bland. Fruit soft
3% Glycerol + 2% Sucaryl + 1% K ₂ HPO ₄	Drink OK. Fruit crisp nice flavor
5% Glycerol + 1% K ₂ HPO ₄	Drink bland. Fruit crisp nice flavor
3% Glycerol + 1.5% Sucaryl + 1.5% Prop.gly + 1% K ₂ HPO ₄	Drink bland. Fruit crisp, bland
1.3% Glycerol + 1.3% Sucaryl + 1.3% Prop.gly + 1% CaCl ₂	Drink bland. Fruit sweet, v.nice
3% Glycerol + 1% Sucaryl + 1% CaCl ₂	Drink bland. Fruit typical nashi
3% Prop.gly + 1% Sucaryl + 1% CaCl ₂	Drink unsuitable. Fruit v.sweet, nice
3% Sucaryl + 1% Glycerol + 1% CaCl ₂	Drink unsuitable. Fruit excellent
3% Sucaryl + 1% Prop.gly + 1% CaCl ₂	Drink unsuitable. Fruit nice, aromatic.
5% Glycerol + 2% CaCl ₂	Drink unsuitable. Fruit firm, very nice
3.5% Glycerol + 1.5% CaCl ₂	Drink unsuitable. Fruit excellent texture, taste
3.5% Glycerol + 2.0% CaCl ₂	Drink unsuitable. Fruit excellent texture, taste
4% Glycerol + 2.0% CaCl ₂	Drink unsuitable. Fruit crisp, excellent taste
4.5% Glycerol + 1.5% CaCl ₂	Drink unsuitable. Fruit crisp, excellent taste
5.5% Glycerol + 1.5% CaCl ₂	Drink unsuitable. Fruit crisp, excellent taste
5.5% Glycerol + 2 CaCl ₂	Drink unsuitable. Fruit crisp, excellent taste
4.5% Propylene Glycol	Drink sour. Fruit water core

4.5% Sorbitol	Drink sweet. Fruit sour
4.5% Mannitol	Drink sweet. Fruit sour

- Results for a selection of apple varieties are presented. It will be recognised that different permutations are available depending on the variety and whether a particular flavour of fruit and/or drink is required, optionally carbonated or with alcohol.

Apples		
Jazz	4% Glycerol + 1% K ₂ HPO ₄	Fruit crisp excellent flavor
Pink Lady	4% Glycerol + 1% K ₂ HPO ₄	Drink bland. Fruit nice
Pink Lady	4% Sucaryl + 1% Glycerol	Drink nice. Fruit excellent
Pink Lady	4% Sucaryl + 1% D-Glucose	Drink sour. Fruit sour, soft
Pink Lady	4% Sucaryl + 3% Sucaryl + 1% D-Glucose	Drink nice. Fruit sweet/bite
Pink Lady	4% Equal + 1% Glycerol	Drink sweet/bitter. Fruit sweet/bite
Pink Lady	5% Glycerol + 1% CaCl ₂ + 1% K ₂ HPO ₄ + 1% D-Glucose + 0.5% Citric Acid	Drink sour. Fruit sour
Braeburn	4% Sucaryl + 1% Glycerol	Fruit and drink excellent
Braeburn	4% Equal + 1% Glycerol	Drink v.sour. Fruit crisp, excellent
Braeburn	2% Sugromax + 1% Glycerol	Drink v.sweet. Fruit crisp, nice
Granny Smith.	4% Sucaryl + 1% Glycerol	Drink and fruit excellent
Braeburn	3% Sucaryl + 1% Glycerol	Fruit and drink excellent
Braeburn	3% Sucaryl + 1% Glycerol + 0.5% Peppermint	Fruit and drink excellent
Braeburn	3% Sucaryl + 1% Glycerol + 5% Grappa	Fruit and drink excellent
Braeburn	3% Sucaryl + 1% Glycerol + 5% Opal Nera	Fruit and drink aniseed nice
Braeburn	3% Sucaryl + 1% Glycerol + 7.5% Brandy	Fruit and drink nice
Braeburn	3% Sucaryl + 1% Glycerol + 7.5% Grappa	Fruit and drink nice
NZ Beauty.	4% Sucaryl + 1% Glycerol + 0.2% Peppermint	Fruit and drink excellent
Jazz	3% Sucaryl + 1% Glycerol + 0.5% CaCl ₂ /NaCl	Drink salty, apple sweet
Jazz	3% Sucaryl + 1% Propylene gly + 0.5% CaCl ₂ /NaCl	Nothing special
Jazz	4.5% Glycerol + 1% K ₂ HPO ₄	Drink bland. Fruit crisp nice

Jazz	4% Glycerol + 1% D-Glucose + 0.5% NaCl	Drink bland. Fruit crisp v nice
Jazz	3% Sucaryl + 1% Glycerol + 7.5% Grappa	Drink and fruit excellent
Sunrise	5% Glycerol + 1% CaCl + 0.5% citric + 1% K ₂ HPO ₄ + 5% D-Glucose	Fruit excellent
Jazz	4% Prop.gly + 0.25% NaCl + 0.75% CaCl ₂	Fruit crisp, nice
Jazz	3% Sucaryl + 1% Prop.gly + 0.5% Na/ CaCl ₂	Fruit crisp, nice
Jazz	4% Glycerol + 0.5% Na/KCl	Strange flavors
Jazz	3% Sucaryl + 1% Glycerol + 0.5% Na/KCl	Strange flavors
Braeburn	4% Glycerol + 0.5% Ca/NaCl	Sour Crisp
Braeburn	4% Glycerol + 0.25% Ca + 0.75% NaCl	V Crisp, fresh
Braeburn	4% Glycerol + 0.75% Ca + 0.25% NaCl	V Crisp, fresh, bite
Braeburn	4% Glycerol + 1% CaCl ₂	Fruit Crisp
Braeburn	4% Glycerol + 1% NaCl	Fruit Crisp
Braeburn	4% Glycerol + 1% NaCl + 1% CaCl ₂	Woody, chewy, softer
Pacific Rose	4% Glycerol + 0.5% Ca/NaCl	Sweet Crisp
Pacific Rose	4% Glycerol + 0.25% Ca + 0.75% NaCl.	V Crisp, fresh
Pacific Rose	4% Glycerol + 0.75% Ca + 0.25% NaCl	V Crisp, fresh, sweet
Pacific Rose	4% Glycerol + 1% CaCl ₂	Fruit Crisp
Pacific Rose	4% Glycerol + 1% NaCl	Fruit Crisp
Pacific Rose	4% Glycerol + 1% NaCl + 1% CaCl ₂	Woody, chewy, softer
Pacific Rose	3% Glycerol + 1% Sucaryl + 1% CaCl ₂	refreshing skin not obvious
Pacific Rose	1% Glycerol + 3% Sucaryl + 1% CaCl ₂	refreshing skin not obvious
Braeburn	3.5% Glycerol + 1.5% D-Glucose + 0.5% CaCl ₂	Crisp, sweet, excellent
Braeburn	3.5% Glycerol + 1.5% D-Glucose	Crisp, sweet, excellent
Braeburn	4% PropyleneGlycol + 1% CaCl	Crisp, Real bite
Braeburn	2% Glycerol + 2% Sucaryl + 0.5% CaCl ₂	Crisp, sharp, excellent
Braeburn	3.5% Glycerol + 1% K ₂ HPO ₄	Crisp, refreshing
Braeburn	1.25% Prop.gly, Sucaryl, glycerol + 0.5% CaCl ₂	Crisp, firm, sharp taste
Braeburn	3.5% Glycerol + 1% CaGluconate	Fruit crisp and refreshing

Braeburn	4.5% Glycerol + 1% K_2HPO_4	Fruit crisp and refreshing
Braeburn	3.5% Glycerol + 1% KH_2PO_4	Fruit crisp and refreshing
Braeburn	3.5% Glycerol + 1% $CaCl_2$ + 1.5% D-Glucose	Fruit crisp and refreshing
Braeburn	3.5% Glycerol + 1.5% $MgSO_4$	Fruit crisp, sweet/sour, bite
Braeburn	3.5% Prop.Glycol + 1.5% $CaCl_2$	Fruit crisp, sharp taste
Braeburn	5% Mannitol	Fruit sweet, soft
Braeburn	5% Mannitol + 1.5% $CaCl_2$	Fruit pink, soft
Braeburn	5% Sorbitol	Fruit soft, chewy.
Braeburn	5% Sorbitol + 1.5% $CaCl_2$	Fruit soft, sour
Braeburn	5% Glycerol	Fruit crisp
Braeburn	5% Glycerol + 1.5% $CaCl_2$	Fruit crisp and refreshing
Braeburn	0.75% Glycerol, Mannitol, sorbitol, prop.glycol	Fruit crisp and refreshing
Braeburn	1% Glycerol, Mannitol, sorbitol, prop.glycol + 1.5% $CaCl$	Fruit v crisp and refreshing
Gala	4.5% Glycerol	Fruit sweet, bland.
Gala	4.5% Glycerol + 1.5% $CaCl_2$	Fruit crisp with bite
Gala	10% Glycerol + 1.5% $CaCl_2$	Fruit crisp, v sweet/sour good
Gala	4.5% Sorbitol	Fruit soft, sweet, bite, nice
Gala	4.5% Sorbitol + 1.5% $CaCl$	Fruit crisp, sweet.
Gala	4.5% Mannitol	Fruit, sweet/sour with bite.
Gala	4.5% Mannitol + 1.5% $CaCl_2$	Fruit, crisp, sweet/sour with bite
Gala	4.5% PropyleneGlycol	Fruit crisp with bite, nice.
Gala	7.5% PropyleneGlycol + 1.5% $CaCl_2$	Fruit crisp, sweet, nice
Gala	1.5% Glycerol + mannitol + sorbitol + Prop Gly	Fruit crisp, sweet/sour, bite
Gala	1.5% Glycerol + mannitol + sorbitol + Prop Gly + 1.5% $CaCl_2$	Fruit crisp, sweet/sour, bite
Gala	4% Glycerol + 1.5% $CaNO_3$	Fruit crisp, sweet/sour
Gala	4% Glycerol + 1.5% D-Glucose	Fruit crisp, sweet nice
Gala	4% Glycerol + 1.5% Ca gluconate	Fruit crisp, v sweet, bite
Gala	4% Glycerol + 1.5% KH_2PO_4	Fruit crisp, refreshing
Gala	4% Glycerol + 1.5% K_2HPO_4	Fruit crisp, refreshing

Gala	4% Glycerol + 1.5% CaCitrate + 1.5% CaCl ₂	Fruit. Crisp, sweet/sour refreshing
Gala	4% Glycerol + 1.5% KH ₂ PO ₄ + 1% CaCl ₂	Fruit crisp, refreshing
Gala	4% Glycerol + 1.5% sucrose + 1% CaCl ₂	Fruit crisp, sweet/sour, bite nice
Gala	4% Sucaryl + 1% Sorbitol	Fruit and drink nice
Gala	4% Sucaryl + 1% Glycerol	Fruit and drink excellent
Gala	4% Equal + 1% Glycerol	Drink v.sour. Fruit crisp, excellent
Gala	2% Sugromax + 1% Glycerol	Drink v.sweet. Fruit crisp, nice
Gala	3% Sucaryl + 1% Glycerol + 5% Grappa	Fruit and drink excellent
Pacific Rose	4.5% PropyleneGly + 1.5% CaCl ₂	Fruit crisp, nice
Pacific Rose	5% PropyleneGly + 1.5% CaCl ₂	Fruit crisp, nice
Pacific Rose	4.5% Glycerol + 1.5% CaCl ₂	Fruit crisp, nice flavor

Example 17

<i>Golden Queen Peaches</i>	
5.5% Glycerol.	Fruit good texture and taste
5.5% Glycerol + 0.5% CaCl ₂	ruit VG texture and taste
5.5% Glycerol + 1.5% CaCl ₂	Fruit VG texture and taste
6% Glycerol + 1% CaCl ₂	Fruit excellent
5.5% Propylene Glycol	Fruit soft, sweet
5.5% Mannitol	Fruit sweet, nice taste
1.5% Glycerol + mannitol + sorbitol + prop.gly	Fruit sweet, nice
4% Glycerol + 1% CaNO ₃	Fruit firm, sour
4% Glycerol + 1% D-Glucose	Fruit VG texture and taste
4% Glycerol + 1% MgSO ₄	Fruit good texture and taste
4% Glycerol + 1% Sorbitol	Fruit firm, sweet, nice

<i>Plums</i>	
10% Glycerol + 4% Sucaryl	Fruit and drink nice
8% Sucaryl + 2% Glycerol + 1% Sorbitol	Fruit and drink nice
4% Sucaryl + 1% Glycerol	Nice drink and fruit, skin split
3% Sucaryl + 3% Glycerol + 3% Sorbitol	Fruit and drink nice
3% Sucaryl + 3% Glycerol + 3% Sorbitol + 7.5% Brandy	Fruit and drink nice
3% Sucaryl + 3% Glycerol + 3% Sorbitol + 7.5% Rum	Fruit and drink nice
8% Sucaryl + 2% Glycerol + 1% Sorbitol + 7.5% Brandy	Fruit and drink nice

8% Sucaryl + 2% Glycerol + 1% Sorbitol + 7.5% Rum	Fruit and drink nice
5% Glycerol + 5% Prop gly + 1.5% CaCl ₂ + 1% K ₂ HPO ₄ + 1% D-Glucose + 0.5% Ascorbic/Citric	Fruit firm good taste and texture

<i>Cherries</i>	
12.5% Glycerol + 1.5% CaCl ₂	Fruit good texture and taste
15% Glycerol + 1% CaCl ₂	Fruit good texture and taste
8% Sucaryl + 2% Glycerol + 2% Sorbitol	Fruit and drink nice
8% Sucaryl + 4% Glycerol + 2% Sorbitol	Fruit and drink nice

Example 18

<i>Strawberries</i>	
6% Sucaryl + 2% Glycerol	Fruit and drink very nice
7.5% Sucaryl + 1.5% Glycerol + 1.5% Sorbitol	Fruit and drink nice
4% Glycerol + 3% Sucaryl + 3% Prop.gly + 0.5% NaCl/ CaCl ₂	Fruit nice
4% Glycerol + 3% Prop.gly + 3% Sucaryl + 1% Corn Syrup + 1% CaCl ₂ + 0.5% NaCl	Fruit firm nice flavor

5 Example 19

<i>Chestnuts</i>	
5% Glycerol + 4% Sucaryl + 4% prop.gly	Drink like ginger ale, fruit good, nutty
5% Glycerol + 4% Sucaryl + 4% prop.gly + 7.5% Brandy	Drink like ginger ale, fruit good, nutty
5% Glycerol + 4% Sucaryl + 4% prop.gly + 7.5% Vodka	Drink nice. Fruit good, nutty
5% Glycerol + 4% Sucaryl + 4% prop.gly + 7.5% Grappa	Drink nice. Fruit good, nutty
10% Glycerol + 2% Sucaryl + 1.5% CaCl ₂	Fruit good

Example 20

<i>Corn (Stored as cobbs in solution)</i>	
7.5 to 10% Sucaryl + 0.5% NaCl	Cobbs fresh
5 to 7.5% Glycerol.	Cobbs fresh
5 to 7.5% Glycerol + 0.5% NaCl	Cobbs fresh
7.5 to 10% Propylene Glycol	Cobbs fresh
2.5 to 5.0% Propylene glycol + 0.5% NaCl	Cobbs fresh

Example 21

Golden delicious apples, lemons, Gold kiwifruit and Ginger pieces were immersed in various solutions for 15 days then weighed to see if water was taken up or lost.

5

<i>Golden Delicious apples</i>					
Treatment	Wgt (g) start	Wgt (g) finish	Difference (g)	Brix soln	Brix Fruit
Water	194.87	195.86	+0.99	0	8.6
2% Glycerol	200.12	201.44	+1.32	1.4	11
4% Glycerol	195.25	195.45	+0.20	3	8
4%Glycerol + CO ₂	179.88	180.97	+1.09	3.4	11
8% Glycerol	189.03	189.09	+0.06	6.8	9
2% Sucaryl + 1% Glycerol	199.86	199.86	0.0	1	9.8
4% Sucaryl + 1% Glycerol	199.55	199.74	+0.19	2	9
4% Sucaryl +1% Glycerol +CO ₂	186.2	186.20	00	1	11.2
8% Sucaryl +2% Glycerol	195.47	197.44	2.47	2	7.6
Mean			0.70	2.28	9.46

Apart from two storage solutions (2% SUCARYL™ + 1% Glycerol, 4% SUCARYL™ + 1% Glycerol + CO₂) which appeared to be isotonic all other treatments appeared to be hypotonic, that is the fruit gained weight. The differential between the brix of the solution and the brix of the fruit was maintained. The presence of CO₂ did not affect membrane permeability. All solutions with SUCARYL™ elicited flavour from the fruit into the solution. Glycerol solutions did not elicit flavours and the solution tasted bland.

15

<i>Lemon</i>					
Treatment	Wgt (g) start	Wgt (g) finish	Difference (g)	Brix soln	Brix Fruit
Water	179.04	183.71	+4.67	0	6.8-Soft
2% Glycerol	179.24	181.09	+1.85	1.6	7.2-Firm
4% Glycerol	177.96	178.97	+1.01	3.4	7 -Firm
4%Glycerol +CO ₂	175.02	175.58	+0.56	3.4	6 -Soft
8% Glycerol	182.85	185.61	+2.76	5	7.6 -Firm
2% Sucaryl + 1%Glycerol	189.20	190.92	+1.72	0.6	7.2 - Firm
4% Sucaryl + 1% Glycerol	194.76	198.18	+3.42	1.4	6.4 -Soft
4% Sucaryl +1%Glycerol +CO ₂	176.12	178.37	+2.25	1.0	7.6 - Soft

8% Sucaryl +2% Glycerol	177.93	182.44	+4.51	3.0	7.4 -Firm
Mean			+2.53	2.15	7.02

- All storage solutions appeared to be hypotonic and weight gains of fruit were more than apples. The brix differential of solutions and fruit were also maintained. Water, 4 % SUCARYL™ and CO₂ softened fruit. The presence of SUCARYL™, elicited citrus flavour and made the drink palatable. This effect was enhanced by CO₂.

<i>Gold Kiwifruit</i>					
Treatment	Wgt (g) start	Wgt (g) finish	Difference (g)	Brix soln	Brix Fruit
Water	201.58	202.88	+1.30	0.0	11.6
2% Glycerol	201.28	202.94	+1.66	2.6	11.6
4% Glycerol	205.47	205.98	+0.51	4.0	12.2
4%Glycerol +CO ₂	197.90	198.44	+0.54	5.0	9.6
8% Glycerol	205.12	205.25	+0.13	7.0	12.6
2% Sucaryl + 1%Glycerol	194.11	195.71	+0.60	0.8	11.4
4% Sucaryl + 1% Glycerol	205.12	206.60	+1.48	1.4	13.8
4% Sucaryl +1%Glycerol +CO ₂	210.03	211.94	+1.91	1.0	14.0
8% Sucaryl +2% Glycerol	198.06	198.72	+0.66	3.0	10.6
			+0.97	2.75	11.93

- All storage solutions appeared to be hypotonic and weight gains of fruit were similar to apples. The brix differential of solutions and fruit were also maintained. Water, 4% SUCARYL™ and CO₂ softened fruit. The presence of SUCARYL™ elicited flavour and made the drink palatable. This effect was enhanced by CO₂.

<i>Ginger pieces</i>					
Treatment	Wgt (g) start	Wgt (g) finish	Difference (g)	Brix soln	Brix Fruit
Water	11.76	13.37	+1.61	0.0	3.0
2% Glycerol	27.42	29.76	+2.34	1.8	3.0
4% Glycerol	20.1	22.64	+2.63	3.0	4.4
4%Glycerol +CO ₂	33.97	34.24	+0.27	3.0	3.6
8% Glycerol	26.20	28.54	+2.34	5.0	5.2
2% Sucaryl + 1%Glycerol	28.85	32.41	+3.56	0.8	2.6
4% Sucaryl + 1% Glycerol	23.86	26.80	+2.94	1.0	3.4
4% Sucaryl +1%Glycerol	35.50	37.32	+1.82	1.2	1.4.

+CO ₂					
8% Sucaryl +2% Glycerol	27.63	29.77	+2.14	2.4	4.0
Mean	26.14	28.31	2.18	2.02	3.4

All storage solutions appeared to be hypotonic and weight gains of fruit were more than apples. The brix differential of solutions and fruit were also maintained. Water, 4% SUCARYL™ and CO₂ softened fruit. The presence of SUCARYL™, elicited citrus flavour and made the drink palatable. This effect was enhanced by CO₂.

The mean data from the foregoing is summarised in the following Table:

Fruit	Mean weight gain	Brix soln	Brix Fruit
Apple	0.70	2.28	9.46
Lemon	2.53	2.15	7.02
Kiwi	0.97	2.75	11.93
Ginger	2.18	2.02	3.4

All storage solutions appeared to be hypotonic but the increase in wet weight was peculiar to the type of produce. This may be explained by consideration of the structure of the whole or diced produce. For instance apple and kiwifruit are both bound by thin skins and both gained a similar amount of weight. Citrus has a thick skin which possibly absorbed solution. The sliced ginger had no external membrane and gained weight. All types of produce maintained the brix difference between the external solution and the inside of the produce, even ginger, indicating cellular integrity is maintained. Carbonation did not appear to rupture cell membranes. Artificial sweeteners elicited fruit flavours into the solute.

Although the invention has been described by way of a first, second and third embodiment of the package beverage and numerous examples of possible storage solutions for use in the method, it is to be appreciated that improvements and/or modifications may be made to these embodiments and examples without departing from the scope of the invention as described. Where in the foregoing description reference has been made to integers or components having known equivalents, then such equivalents are incorporated as if individually set forth.

CLAIMS:

- 1) A **packaged beverage** comprising a releasably sealed container containing harvested produce immersed in an aqueous storage solution where the container comprises a first releasable seal and
5 a second releasable seal configured to permit the egress of the storage solution without the harvested produce when the first releasable seal is released and egress of the harvested produce when the second releasable seal is released.
- 2) The packaged beverage of claim 1 where a neutral water potential is
10 established when the harvested produce is immersed in the aqueous storage solution.
- 3) The packaged beverage of claim 1 where the storage solution is a moderately hypotonic to substantially isotonic storage solution.
- 4) The packaged beverage of claim 1 where there is no significant
15 change in the Brix value of the storage solution of the packaged beverage during the period of storage.
- 5) The packaged beverage of claim 1 where the storage solution is a carbonated storage solution.
- 6) The packaged beverage of claim 1 where the storage solution is an
20 alcoholic storage solution.
- 7) The packaged beverage of claim 6 where the storage solution is an alcoholic storage solution where the source of alcohol is selected from the group consisting of: pomace brandy, triple sec liqueur, gin, vodka and whisk(e)y (or bourbon).
- 25 8) The packaged beverage of claim 1 where the storage solution comprises a combination of solutes selected from the group consisting of: artificial sweeteners and polyhydric alcohols (polyols).
- 9) The packaged beverage of claim 8 where the storage solution
30 comprises a combination of artificial sweeteners and polyhydric alcohols (polyols) where the artificial sweeteners are selected from the group consisting of: SUCARYL™ (Abbott) (sodium cyclamate 8% (w/v) (952), sodium saccharin 0.8% (w/v) (954), benzoic acid 0.1% (210)); EQUAL™ (Merisant) (5% Benzoic acid (210), potassium benzoate (212)) and SUGORMAX™ (Hansells) (16% sodium cyclamate, 4%
35 saccharin, malic acid, preservatives (211, 202)) and the polyhydric alcohols (polyols) are selected from the group consisting of:

glycerol, inositol, mannitol, and sorbitol.

- 10) The packaged beverage of claim 1 where the harvested produce is whole fruit.
- 5 11) The packaged beverage of claim 10 where the harvested produce is whole fruit selected from the group consisting of: apple, blackberries, blueberries, cherries, citrus, grapes, kiwifruit, peaches, pear, plums, raspberries and strawberries.
- 12) The packaged beverage of claim 1 where the harvested produce is diced root vegetables.
- 10 13) The packaged beverage of claim 1 where the harvested produce is diced root vegetables selected from the group consisting of: beetroot, carrot and ginger.
- 14) A **method** of storing harvested produce comprising the step of immersing the harvested produce in an aqueous storage solution
15 contained in a releasably sealed container to establish a neutral water potential.
- 15) The method of claim 14 where the storage solution is a moderately hypotonic to substantially isotonic storage solution.
- 16) The method of claim 14 where there is no significant change in the
20 Brix value of the storage solution during the period of storage.
- 17) The method of claim 14 where the storage solution is a carbonated storage solution.
- 18) The method of claim 14 where the storage solution is an alcoholic storage solution.
- 25 19) The method of claim 18 where the storage solution is an alcoholic storage solution where the source of alcohol is selected from the group consisting of: pomace brandy, triple sec liqueur, gin, vodka and whisk(e)y (or bourbon).
- 20) The method of claim 14 where the storage solution comprises a
30 combination of solutes selected from the group consisting of: artificial sweeteners and polyhydric alcohols (polyols).
- 21) The method of claim 20 where the storage solution comprises a combination of artificial sweeteners and polyhydric alcohols (polyols) where the artificial sweeteners are selected from the
35 group consisting of: SUCARYL™ (Abbott) (sodium cyclamate 8% (w/v)

- (952), sodium saccharin 0.8% (w/v) (954), benzoic acid 0.1% (210)); EQUAL™ (Merisant) (5% Benzoic acid (210), potassium benzoate (212)) and SUGORMAX™ (Hansells) (16% sodium cyclamate, 4% saccharin, malic acid, preservatives (211, 202)) and the polyhydric alcohols (polyols) are selected from the group consisting of: glycerol, inositol, mannitol, and sorbitol.
- 5
- 22) The method of claim 14 where the container is a releasably sealed container.
- 23) The method of claim 22 where the container is a releasably sealed container where the container comprises a first releasable seal and a second releasable seal configured to permit the egress of the storage solution without the harvested produce when the first releasable seal is released and egress of the harvested produce when the second releasable seal is released.
- 10
- 24) The packaged beverage of claim 1 containing a combination of produce and storage solution as described in the Examples.
- 15