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(54) **Titre : COMPOSITIONS CONTENANT UN ISOLAT DE CACTUS NOPAL ET LEUR PROCEDE DE PREPARATION**
(54) **Title: COMPOSITIONS CONTAINING A NOPAL CACTUS ISOLATE AND METHOD FOR MAKING SAME**

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(57) **Abrégé/Abstract:**
Compositions and methods of making compositions containing nopal cactus isolates derived from the juice and/or soluble solid fractions of nopal pads. In another aspect, the invention relates comestible containing the nopal cactus isolates. In yet another aspect, the invention relates to compositions for making tea, tea compositions and methods of making such compositions, which contain nopal cactus isolates.

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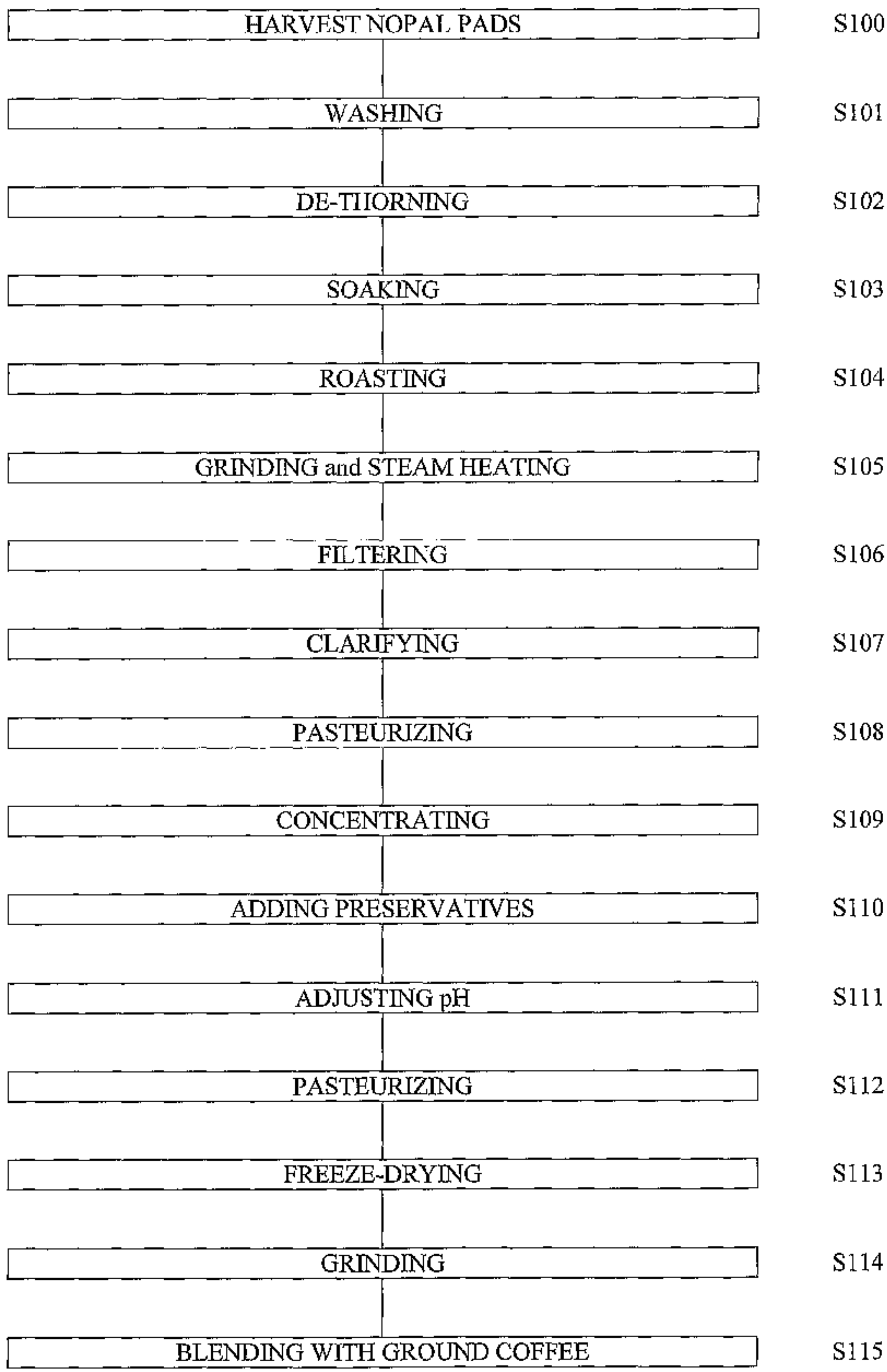
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**COMPOSITIONS CONTAINING A NOPAL CACTUS ISOLATE
AND METHOD FOR MAKING SAME**

5

BACKGROUND OF THE INVENTION

The present invention relates to dietary supplements and compositions
10 containing nopal cactus isolates derived from the juice and/or soluble solid fractions
of nopal pads and methods of preparing the supplements and compositions. The
invention also specifically relates to compositions for making coffee, coffee
compositions and methods for making such compositions, which contain the nopal
cactus isolates.

15 In developed countries around the world, there is a tremendous interest in
personal fitness and wellness. At the same time there is a disturbing trend that people,
including adults and children are becoming overweight. By overweight, it is meant
that the subject has exceeded acceptable weight range and percent body fat generally
considered as healthy determined by factors including, but not necessarily limited to
20 age, height, sex, and body type. For example, over 50% of the human population in
the United States is considered overweight, approximately 20% being obese. Obesity
produces a wide range of health concerns including sleep apnea, orthopedic
complications, arterial sclerosis, diabetes and heart disease. All these undesirable
conditions contribute in development of an unsatisfactory quality of life and in some
25 cases premature death.

Many studies have been conducted to identify the factors that contribute to
being overweight. The main factors include high caloric density in foods, large
portion sizes, diets that are rich in fat, decreasing amounts of exercise, high
availability of food, increased numbers of eating occasions, low knowledge of actual
30 foods and portions eaten by the consumer, lack of information on energy expenditure

through normal daily activities and exercise, and eating stimulated by stress, hormonal shifts during the menstrual cycle for women, and hunger. A number of approaches to control the caloric balance including consumable products have been developed with mixed success. In the United States, over the counter weight loss products are sold to help consumers reduce their weight or maintain current weight. These products are grouped into over the counter diet aids and meal replacements. The over the counter diet aids include appetite suppressants, like Dexatrim® and Acutrim®, which both use phenylpropranolamine (PPA) as the appetite suppressant. This appetite suppressant can even be released over time to help control hunger for longer periods of time for the consumer. In addition, there are dietary supplements, like Metabolife 356®, which help people with their diets while providing energy. Consumers use these products up to 3 times a day to help control hunger and increase energy. However, many supplements have been shown to have potentially dangerous side effects, such as increased risk of hemorrhagic stroke from PPA containing supplements.

There are also prescription drugs that can help consumers to lose weight that fall into the anti-obesity drug class. These drugs are used to decrease appetite or increase the feeling of being full by possibly increasing levels of serotonin or catecholamine--two brain chemicals that effect mood and appetite. Examples of products in this group include Fastin® from Smith-Kline-Beechan which uses phentermine hydrochloride, Meridia® from Knoll-BASF Pharma which uses sibutramine and Pondimin® from Wyeth Ayerst which uses phenfluramine hydrochloride and Redux® from Wyeth Ayerst which uses dexfenfluramine. All of these products must be obtained through a physician by use of a prescription. Again, such products typically include potent stimulants that can have potentially dangerous side effects, such as increased blood pressure and, in some cases, damage to a patient's pulmonary system. Some prescription diet drugs can also be highly addictive resulting in the patient becoming physically and psychologically dependent on the medication.

There are also commercial weight loss programs available through programs like Weight Watchers®, Jenny Craig®, and hospital supervised programs that are designed to help consumers track energy intake and energy output through a variety

of techniques and devices. While many of the technologies mentioned above can be useful in losing weight, the problem is keeping the weight off. Short term diets can be unhealthy because it causes the body to adopt a starvation mode, lowers the metabolism and lowers the ability to burn fat. Often people "yo-yo", that is, lose large amounts of weight only to gain it back once they get off the weight loss program they were on. This so-called "yo-yo" effect can damage a person's health by zapping energy and destroying their metabolism, leading to binge eating, craving and feelings of deprivation.

Cardiovascular disease is a leading cause of morbidity and mortality, particularly in the United States and in Western European countries. Several causative factors are implicated in the development of cardiovascular disease including hereditary predisposition to the disease, gender, lifestyle factors such as smoking and diet, age, hypertension, and dyslipidemia, including hyperinsulinemia due to insulin resistance. Several of these factors, particularly dyslipidemia and chronically elevated serum insulin, contribute to the development of atherosclerosis, a primary cause of vascular and heart disease.

Insulin resistance is a common metabolic disorder in modern Western society, predisposed to largely as a result of factors in modern Western society living. Poor insulin activity and chronically elevated blood insulin levels are associated with a number of serious diseases. Among these, hypertension, obesity, ischaemic heart disease, dyslipidemia and non-insulin-dependent diabetes mellitus (NIDDM) are major diseases in which insulin resistance has a clearly demonstrated relationship with the etiology and clinical course of the disease.

Nopal cactus fruit and pads of the opuntia cactus genus have been a food staple of the natives of the Americas for thousands of years. Virtually every fruit and vegetable store in Mexico, central and South America sell the fruit and young tender nopal pads. The fruit is also known as prickly pear fruit. The fleshy leaves (or pads) of the nopal cactus are large, circular, paddle-like members that typically grow to be 7 to 10 inches in length, 4 to 5 inches in width and 0.5 inches thick.

It has been reported that the fruit and pads from the opuntia genus of cactus, which are rich in vitamins and minerals, act as natural fat blockers, can reduce serum

low-density lipoprotein-cholesterol (LDL), and can reduce blood glucose levels in hyperglycemic individuals by increasing insulin sensitivity. However, in order to realize the full health benefits of the fruit and pads of the prickly pear cactus, a person would need to consume a significant amount (e.g., 300-500g of cooked nopal pads per
5 day) of the fruit or pads on a regular basis. Moreover, the fruit and pads of the prickly pear cactus are not available in all areas or during all seasons.

Thus, there is a need for new dietary or nutritional food products containing natural ingredients which are effective for lowering cholesterol, stabilizing blood glucose and insulin levels and promoting healthy weight management, which can
10 reduce the risks of coronary heart disease and diabetes without the side effects and disadvantages of known supplements or products, including the disadvantages described above. Moreover, new methods and compositions utilizing concentrated nopal cactus components which are capable of providing significant lowering of LDL in the blood to significantly reduce the risk of atherosclerosis and coronary heart
15 disease remain desirable.

SUMMARY OF THE INVENTION

The present invention is directed to dietary supplements and compositions containing nopal cactus isolates and methods of preparing the supplements and compositions. The isolates are derived from the juice and/or soluble solid fractions of
20 nopal pads of the *opuntia* genus, preferably the *opuntia ficus indica* and/or *opuntia streptacantha lemaire* variety. The invention also specifically relates to compositions for making coffee, coffee compositions and methods for making such compositions, which contain the nopal cactus isolates.

In one aspect, the invention relates to a composition for making coffee which
25 includes a nopal cactus isolate and roasted ground coffee beans. The isolate is preferably derived from the juice and/or soluble solid fractions of nopal pads of the *opuntia* genus. Preferably, the nopal pads are from the *opuntia ficus indicia* and/or *opuntia streptacantha lemaire* variety.

The nopal cactus isolate can be freeze-dried. Preferably, the freeze-dried isolate is present in an amount to enhance weight reduction and/or reduce cholesterol as a result of consuming the coffee made from the composition.

5 It is preferred that the nopal pads are young nopal pads harvested prior to flowering of the cactus plant. It is also preferred that the nopal pads are roasted in a controlled manner to enhance the flavor of the isolate. More specifically, the isolate can have a flavor that is compatible with brewed coffee.

The composition can be in a form suitable for making coffee by a method selected from the group consisting of drip, percolation, press, espresso, latte, instant
10 coffee and flow-through bag. Preferably, the coffee made by the present composition is intended to be served hot.

In another aspect, the invention is directed to a method of making a coffee composition which includes blending a freeze-dried nopal isolate powder with ground coffee beans.

15 In a preferred embodiment, the isolate powder is prepared by (i) roasting nopal cactus pads of *opuntia ficus indica* and/or *opuntia streptacantha lemaire* variety to enhance the flavor of coffee prepared from the coffee composition; (ii) substantially separating insoluble pulp from soluble solids and nopal pad juice; (iii) concentrating the juice and soluble solids; and (iv) freeze-drying the concentrate to form a powder.

20 The nopal cactus pads are typically (i) cleaned and de-thorned before roasting and (ii) ground after roasting to release the nopal pad juice and soluble solids. The nopal cactus pads can be cleaned using a water and chlorine solution to remove organic debris. In one embodiment, the pads are soaked in a solution having a pH of about 7.5 for about 10 minutes, e.g., in a sodium bicarbonate solution, prior to
25 roasting. The roasting step preferably includes roasting the pads to achieve about a level 2 roast, on the coffee roasting scale. The grinding of the pads is preferably accomplished by using a hammer mill grinder.

In one embodiment, the ground nopal pads are heated sufficiently to substantially inactivate cellulase enzymes naturally present in the pads prior to
30 separating insoluble pulp from the juice and soluble solid fractions. Inactivating

cellulose enzyme stabilizes the nutrients present in the nopal filet and prevents it from breaking down. Preferably, the heating is accomplished by immediately steam heating the ground nopal pads to at least about 160°F. More preferably, the ground nopal is steam heated immediately after grinding. Most preferably, the heating is
5 accomplished by simultaneously steam heating and grinding the nopal pads.

The separating step is preferably accomplished by filtering the insoluble pulp out of the juice and soluble solid fractions.

In an embodiment of the invention, the method includes pasteurizing the juice and soluble solids fractions. Preferably, the pasteurization is accomplished by flash
10 pasteurizing the juice and soluble solid fractions, e.g., at a temperature of at least about 192°F for about 10 seconds. The pasteurized juice/soluble solids can then be concentrated by concentrating the pasteurized juice and soluble solid fractions to a concentrate suitable for freeze-drying. The concentrating step is preferably accomplished by using reverse osmosis to concentrate the juice to about a 12% solids
15 concentration.

In another embodiment, the method includes adjusting the pH of the concentrated juice and soluble solids to substantially match the pH of coffee. Preferably, the concentrate is adjusted to a pH of about 5.0. The method can also include subjecting the adjusted concentrate to a second pasteurization step.
20 Preferably, the second pasteurization step is carried out by flash pasteurizing the concentrate, e.g., at a temperature of at least about 192°F for about 10 seconds.

In one embodiment, the method also includes filtering the juice and soluble solid fractions to provide a substantially clear liquid. The filtering step is preferably accomplished by recycling the juice through a diatomaceous earth filter. The
25 substantially clear liquid is preferably pasteurized and concentrated to a concentrate suitable for freeze-drying. The pH of the substantially clear liquid is preferably adjusted to substantially match the pH of coffee.

It is also contemplated that the method includes adding at least one preservative to the nopal juice and/or soluble solid fractions prior to freeze-drying.

The concentrated juice and soluble solids are preferably freeze-dried to form a powder that has a moisture content of less than about 7%. The freeze-dried powder can be ground to a selected size prior to blending with the ground coffee beans. Preferably, the freeze-dried nopal powder is ground to a granule size of about 100
5 mesh.

The final coffee composition blend preferably contains about 2 to about 30 wt%, more preferably, about 5 to about 25 wt% and, most preferably, about 5 to about 9 wt % of the ground freeze-dried nopal powder.

In another aspect, the invention is more generally directed to a dietary
10 supplement, which includes a nopal cactus isolate derived from the juice and/or soluble solid fractions of nopal pads of the *opuntia ficus indica* and/or *opuntia streptacantha lemaire* variety.

In one embodiment, the supplement includes a therapeutically effective amount of the isolate to reduce or maintain weight, to reduce cholesterol, or to
15 accomplish both. The isolate is preferably derived from young nopal pads harvested prior to flowering of the plant. Preferably, the nopal pads are roasted to enhance the flavor of the isolate. In one embodiment, the supplement is in liquid form. Preferably, the supplement is in a form selected from the group consisting of flavored water, juice, coffee and tea.

20 In yet another aspect, the invention is directed to a method for making a dietary supplement, which includes roasting nopal cactus pads of the *opuntia* genus; grinding the roasted pads; substantially separating juice and soluble solid fractions from insoluble fractions of the ground and roasted pads; and freeze-drying the juice and soluble fractions. Preferably, the nopal pads are of a variety selected from the
25 group consisting of *opuntia ficus indica*, *opuntia streptacantha lemaire* and combinations thereof.

The method can include blending the nopal isolate with ground roasted coffee beans to provide a composition suitable for brewing coffee. In such a case, the roasting step is preformed under conditions to develop a taste that will be compatible
30 with brewed coffee.

The method can also include, prior to freeze-drying, the steps of heating the ground nopal pads to inactivate the cellulase enzyme naturally present in fresh nopal pads; filtering out the insoluble pulp from the nopal pad juice and soluble solid fractions; filtering the nopal pad juice and soluble solid fractions until the juice
5 becomes clear; flash pasteurizing the clear juice; concentrating the pasteurized juice to a concentration suitable for freeze-drying; adjusting the pH of the concentrate; and subjecting the concentrate to a second flash pasteurization step. Preferably, the pH is adjusted to about 5.0. The method can also include adding at least one preservative to the juice.

10 In yet another aspect, the invention is directed towards a method for lowering cholesterol, stabilizing blood glucose and insulin levels and/or promoting healthy weight management. In one embodiment, the method includes administering coffee made from the composition for making coffee which includes a nopal cactus isolate, as described above, in a therapeutically effective amount and at a frequency sufficient
15 to lower cholesterol, stabilize blood glucose and insulin levels and/or promote healthy weight management.

In another aspect, the invention is directed to an item of manufacture which includes a container containing a coffee composition, that includes a blend of ground roasted coffee and a nopal cactus isolate, wherein the container is associated with
20 printed labeling advising of the attributes or benefits of the coffee composition or an ingredient thereof. The attributes or benefits can include lowering cholesterol, stabilizing blood glucose and insulin levels or reducing (or maintaining) weight by consuming coffee made from the coffee composition.

In another aspect, the invention is directed to a nopal composition which
25 includes a water soluble isolate derived from nopal pads of the *opuntia* genus. Preferably, the nopal pads are of a variety selected from the group consisting of *opuntia ficus indica*, *opuntia streptacantha lemaire* and combinations thereof. Preferably, the isolate is substantially free of active cellulase enzymes.

In a preferred embodiment, the nopal pads are young nopal pads harvested
30 prior to flowering of the cactus plant. Preferably, the nopal pads are roasted in a controlled manner to enhance the flavor of the isolate. In one embodiment, the isolate

consists essentially of juice and water soluble solid fractions of the nopal pads. The isolate can be added as an ingredient to a variety of foods or beverages to provide the health benefits of the phytonutrients which are naturally found in the water soluble components of the nopal pads and contained in the isolate.

5 In another aspect, the invention is directed to a nopal composition which includes a water soluble solidified isolate derived from nopal pads of the *opuntia* genus. The nopal pads are preferably of a variety selected from the group consisting of *opuntia ficus indica*, *opuntia streptacantha lemaire* and combinations thereof. In one embodiment, the isolate consists essentially of juice and water soluble solid
10 fractions of the nopal pads. Preferably, the isolate is a solid and, more preferably, a freeze-dried solid.

The nopal pads are preferably young nopal pads harvested prior to flowering of the cactus plant. The nopal pads are also preferably roasted in a controlled manner to enhance the flavor of the isolate. In one embodiment, the isolate is in a form of a
15 dispersion of solid particles. The isolate is preferably rich in phytonutrients naturally found in the water soluble fractions of said nopal pads. These phytonutrients are preferably substantially preserved and concentrated in the isolate. Preferably, the solid isolate has a solubility of at least about 150 g/liter of water, more preferably at least about 200g/liter of water and most preferably about 250g/liter of water
20 (measured at 20°C). In one embodiment, the solid isolate can be reconstituted to a liquid by adding water and mixing. Preferably, the isolate is in a form of a dispersion of solid particles having a moisture content of less than about 10 wt%. The isolate can be in a form selected from the group consisting of pellets, granules and powder. The solid isolate can be stored for extended periods of time and can be added as an
25 ingredient to a variety of foods or beverages.

In yet another aspect, the invention is directed to a comestible that includes a water soluble isolate derived from nopal pads of the *opuntia* genus and at least one other edible ingredient. Preferably, the nopal pads are of a variety selected from the group consisting of *opuntia ficus indica*, *opuntia streptacantha lemaire* and
30 combinations thereof. The comestible can be in a form selected from the group consisting of a drink, powdered drink mix, fruit based or herbal infusion, brewable

mixture, soup, yogurt, pudding, chocolate, candy and an ingredient thereof. In one embodiment, the comestible is freeze-dried. Preferably, the isolate is freeze-dried.

In another aspect, the invention is directed to a composition for making tea comprising a nopal cactus isolate and dried leaves, stems and/or buds of the shrub
5 *Camellia sinensis*. Preferably, the nopal cactus isolate is derived from the juice and/or soluble solid fractions of nopal pads of the *opuntia* genus. More preferably, the nopal pads are of a variety selected from the group consisting of *opuntia ficus indica*, *opuntia streptacantha lemaire* and combinations thereof. The nopal cactus isolate is preferably freeze-dried.

10 In one embodiment, the freeze-dried isolate is present in an amount sufficient to enhance weight reduction and/or reduce cholesterol as a result of consuming the tea made from the composition.

Preferably, the nopal pads are roasted in a controlled manner to enhance the flavor of the isolate and make it compatible with brewed tea. The composition can be
15 in a form suitable for making tea by a method selected from the group consisting of brewing, steeping, instant tea and flow-through bag. The instant tea composition can be made by combining the nopal isolate with a typical tea blend and brewing (or steeping) in hot water to produce a tea, followed by freeze drying the resulting tea to provide an instant freeze-dried tea that can be reconstituted with water.

20 The dried leaves, stems and/or buds of the shrub *Camellia sinensis* can include classifications of teas selected from the group consisting of black tea, green tea, oolong, white tea and blends thereof. Additionally, the dried leaves, stems and/or buds can include specific classifications of teas selected from the group consisting of pu-erh, brick tea, yellow tea, chong cha, kukicha, lapsang souchong, rize tea and
25 blends thereof.

In yet another aspect, the invention is directed to a method for making a water soluble solidified isolate derived from nopal pads of the *opuntia* genus. The method preferably includes roasting the nopal pads; substantially separating insoluble pulp from water soluble solid and juice fractions; and forming a solidified isolate from the
30 soluble solid and juice fractions. The isolate can be prepared according to the steps

described above with respect to the coffee composition, however, with the roasting, pH and grinding tailored for the desired end use, i.e., the food or beverage product.

In another aspect, the invention is directed to a method for making a tea composition which includes combining a water soluble solid nopal isolate with dried
5 leaves, stems and/or buds of the shrub *Camellia sinensis*. The solid nopal isolate can be prepared as discussed above, but under specific roasting, pH and grinding conditions to achieve an isolate having a taste compatible with the desired tea product. Preferably, the nopal pads are roasted to about a level one (1) or level two (2) roast on the coffee roasting scale and the pH of the isolate is adjusted to substantially match
10 the pH of the resulting tea. The solid isolate, e.g., a freeze-dried isolate, is preferably ground to a particle size to maximize the dissolution of the solid isolate under the desired brewing conditions. For a typical flow-through bag tea product, the particle size is preferably about 100 mesh.

In another aspect, the invention is directed to an item of manufacture that
15 includes a container containing a comestible which includes a water soluble isolate derived from nopal pads of the *opuntia* genus, wherein the container is associated with printed labeling or contents information advising of attributes or benefits of the nopal isolate or the comestible. These attributes or benefits can include lowering cholesterol, stabilizing blood glucose levels, stabilizing blood insulin levels, reducing
20 weight, maintaining weight and combinations thereof. The attributes can also include caloric or compositional data, e.g., the number of calories of the isolate or the comestible product containing the isolate, or the amount of isolate present in the comestible.

Additional objects, advantages and novel features of the invention will be set
25 forth in part in the description and examples which follow, and in part will become apparent to those skilled in the art upon examination of the following, or may be learned by practice of the invention. The objects and advantages of the invention may be realized and attained by means of the instrumentalities and combinations particularly pointed out in the appended claims.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is a flowchart showing a process for preparing a coffee blend containing isolate granules from nopal cactus pads according to a preferred embodiment of the present invention.

5

DETAILED DESCRIPTION OF THE INVENTION

The present invention is directed to dietary supplements and compositions containing nopal cactus isolates, methods of making such supplements and methods for improving health by consuming such supplements. The isolates are preferably derived from the juice and/or soluble solid fractions of nopal pads of the *opuntia ficus*
10 *indica* and/or *opuntia streptacantha lemaire* variety.

The nopal cactus isolates according to the invention maximize the effects of lowering cholesterol, stabilizing blood glucose and insulin levels and promoting healthy weight management, which can reduce the risks of coronary heart disease and diabetes without the side effects and disadvantages of other supplements or products
15 currently being used. While not being bound by theory it is believed that the nopal cactus isolates of the present invention maximize the concentration and availability of phytonutrients which are naturally contained in the nopal pad juice and soluble solid fractions and which are effective for lowering cholesterol, stabilizing blood glucose and insulin levels and promoting healthy weight management. It is also believed that
20 by isolating the juice and soluble solid fractions from the insoluble fiber and solid materials, the availability and uptake of the desired phytonutrients is improved.

The nopal cactus isolates are also prepared in such a way as to enhance the flavor of the nopal pad juice and resulting isolate, and to achieve a particle size and density which is compatible with a selected foodstuff or supplement, e.g., ground
25 coffee or tea. This results in food products having superior flavor, while maximizing the delivery and uptake of the phytonutrients naturally found in the nopal pad juice and soluble solid fractions.

Consuming coffee which contains the nopal pad isolates is a convenient and effective way to obtain the health benefits of the nopal isolates. It is also believed that
30 the nopal isolates and coffee work together synergistically to increase metabolism,

reduce obesity and control weight, while at the same time lowering cholesterol and blood glucose and insulin levels.

In one aspect, the invention relates to a composition for making coffee which includes a nopal cactus isolate, derived from the juice and/or soluble solid fractions of
5 nopal pads of the *opuntia ficus indica* variety, and roasted ground coffee beans.

The nopal cactus isolate can be freeze-dried. Preferably, the freeze-dried isolate is present in an amount to enhance weight reduction and/or reduce cholesterol as a result of consuming the coffee made from the composition.

It is preferred that the nopal pads are young nopal pads harvested prior to
10 flowering of the cactus plant. It is also preferred that the nopal pads are roasted in a controlled manner to enhance the flavor of the isolate. More specifically, the isolate can have a flavor that is compatible with brewed coffee.

The composition can be in a form suitable for making coffee by a method selected from the group consisting of drip, percolation, press, espresso, latte, instant
15 coffee and flow-through bag. Preferably, the coffee made by the present composition is intended to be served hot. Thus, it is also contemplated that the composition can be brewed into coffee and then the brewed coffee can be freeze-dried or otherwise formed into a reconstitutable powder that, when reconstituted with hot water, provides a nutritionally superior product to simple brewed coffee, and that possesses the health
20 benefits of the nopal pad isolate.

It is also contemplated that the coffee can contain other ingredients to provide additional health benefits or to improve the drinking experience. Preferably, the ingredients that provide additional health benefits are natural health promoting ingredients, such as, for example, Bitter Orange, Gracinia Cambogia or Kola Nut
25 Extract.

Ingredients that improve the drinking experience can include sweeteners, whitening agents or flavorants. Preferred flavorants include spices such as cinnamon, mint, peppermint, cardamom, ginger and nut flavors.

While not being bound by theory, it is postulated that the nopal pad isolates in combination with coffee according to the present invention allows the phytonutrients of the nopal pad isolates to rapidly disperse and thereby be more available for their cholesterol lowering and blood glucose lowering effects. Accordingly, while it is preferred that the coffee is regular caffeine containing coffee, it is also contemplated that the coffee blend according to the invention can include de-caffeinated coffee, reduced caffeine coffee or a combination (or mixture) of regular caffeinated and decaffeinate coffee.

In another aspect, the invention is directed to a method of making a coffee composition which includes blending a freeze-dried nopal isolate powder with ground coffee beans. It is also contemplated that the nopal isolate powder can be prepared by other methods, such as, for example, spray drying.

In a preferred embodiment, the isolate powder is prepared by (i) roasting nopal cactus pads of *opuntia ficus indica* and/or *opuntia streptacantha lemaire* variety to enhance the flavor of coffee prepared from the coffee composition; (ii) substantially separating insoluble pulp from soluble solids and nopal pad juice; (iii) concentrating the juice and soluble solids; and (iv) freeze-drying the concentrate to form a powder.

The nopal pads, preferably the new petal growth, referred to as the "nopalito" from the *opuntia ficus indica* and/or *opuntia streptacantha lemaire* species of cactus, are selectively harvested, typically by cutting each leaf (or pad) manually.

The nopal cactus pads are then typically (i) cleaned and de-thorned before roasting and (ii) ground after roasting to release the nopal pad juice and soluble solids. The harvested nopal pads are first cleaned, e.g., by washing in a water and chlorine mixture to remove organic debris. The nopal pads are then de-thorned, e.g., by manually removing the thorns. In a preferred embodiment, the de-thorned pads are soaked in a basic solution, preferably about at a pH of about 7.1 to about 8.5, and more preferably about 7.5, for about 10 minutes prior to roasting, for example, in a sodium bicarbonate solution. It is believed that this soaking step maximizes or at least improves, the extraction of the desirable phytonutrients.

The roasting step preferably includes roasting the cleaned and de-thorned pads to achieve about a level 2 roast, on the coffee roasting scale. The coffee roasting scale is well known to those skilled in the art of coffee bean roasting and is based on the color of the roasted beans. The roasted beans are rated on a scale from 1 to 5, with 1
5 being the lightest roast and 5 being a very dark roast. The roasting step can be carried out by roasting the nopal pads at a temperature of about 250-400°F for about 3-5 minutes with each side being roasted for approximately 1.5 - 2.5 minutes. An Excelsior Drum Roaster made by Probat was found to be acceptable for roasting the nopal pads.

10 The roasted pads can be ground by any conventional means which sufficiently disrupts or dissociates the juice and soluble solid fractions from the insoluble solid or fiber fractions of the pads. The grinding of the pads is preferably accomplished by using a hammer mill grinder.

In one embodiment, the ground nopal pads are heated sufficiently to
15 substantially inactivate cellulase enzymes naturally present in the pads prior to separating insoluble pulp from the juice and soluble solid fractions. Preferably, the heating is accomplished by steam heating the ground nopal pads to at least about 140°F, more preferably at least about 150°F and most preferably at least about 160°F. The heating step is preferably carried out immediately upon grinding the pads.
20 Preferably, a hammer mill grinder equipped with steam nozzles, such as the Ritz Disintegrator, Model RP12, is used to immediately heat the ground nopal, i.e., steaming simultaneously while grinding. In addition to inactivating cellulose enzymes, heating with steam reduces the viscosity of the nopal juice. It is believed that this simultaneous steaming while grinding preserves the pharmacologically active
25 components of the nopal for maximum efficaciousness and prevents degradation of such components. It is also believed that immediate steam heating after grinding (or simultaneous with grinding) also pasteurizes the nopal material, preventing breakdown of nutrients by microorganisms and preserving the efficaciousness of the material during processing.

30 The separating step is preferably accomplished by filtering the insoluble pulp out of the juice and soluble solid fractions. The filtering step can be accomplished by

filtering the juice and soluble solid fractions, using a finisher of a type well known in the food processing industry. For example, a Brown Model No. 3900 or 2503 screw type finisher is suitable for separating out the insoluble solid fractions from the juice and solid soluble fractions.

5 In an embodiment of the invention, the method includes pasteurizing the juice and soluble solid fractions. The isolated juice/soluble solid fractions can be pasteurized using known methods to stabilize and significantly reduce the amount of any micro-organisms present. Preferably, the pasteurization is accomplished by flash
10 pasteurizing the juice and soluble solid fractions at a temperature of at least about 170°F, more preferably at least about 180°F and most preferably at least about 192°F for about 10 seconds.

The pasteurized juice/soluble solids can then be concentrated by concentrating the pasteurized juice and soluble solid fractions to a concentrate suitable for freeze-drying. The concentrating step is preferably accomplished by removing water to
15 provide a concentrate having at least about 8 wt %, more preferably at least about 10 wt % and most preferably at least about 12 wt % solids concentration. Preferably, the concentrating step is carried out at room temperature by using an Osmonics reverse osmosis method to achieve about a 12 to 15 wt % solids concentration. It is believed that concentrating the juice/soluble solids by reverse osmosis prevents thermal
20 breakdown of the long chain glucomannons and polyphenols, maximizing the efficaciousness of the finished product.

In another embodiment, the method includes adjusting the pH of the concentrated juice and soluble solids to substantially match the pH of coffee. Preferably, the concentrate is adjusted to a pH of about 5.0. The method can also
25 include subjecting the adjusted concentrate to a second pasteurization step. Preferably, the second pasteurization step is also carried out by flash pasteurizing the concentrate at a temperature of at least about 170°F, more preferably at least about 180°F, and most preferably at least about 192°F for about 10 seconds.

In one embodiment, the method also includes filtering the juice and soluble
30 solid fractions to provide a substantially clear liquid. This filtering step is preferably carried out following the initial separation step and prior to the first flash

pasteurization step. The filtering step is preferably accomplished by recycling the juice through a diatomaceous earth filter. Such a filtering process is well known and can be accomplished using a plate and frame filter press, in which the diatomaceous earth accounts for about 10 wt % of the filter cake. The substantially clear liquid is
5 preferably pasteurized and concentrated to a concentrate suitable for freeze-drying. The pH of the substantially clear liquid is also preferably adjusted to substantially match the pH of coffee.

It is also contemplated that the method includes adding at least one preservative to the nopal juice and/or soluble solid fractions prior to freeze-drying.
10 While any number of known preservatives can be used, the preferred preservatives are sodium benzoate and potassium sorbate. For example, it has been found that adding 0.05% sodium benzoate and 0.05% potassium sorbate, based on the weight of the total concentrate, maintains the freshness of the concentrate without adversely affecting the taste or appearance of the final product.

15 The concentrated juice and soluble solids are preferably freeze-dried to form a powder that has a moisture content of less than about 12%, more preferably less than about 10% and most preferably less than about 7% by weight. The freeze-dried powder can be ground to a selected size prior to blending with the ground coffee beans. Preferably, the freeze-dried nopal powder is ground to a size sufficient to
20 permit 100% of the powder to pass through a 100 mesh screen.

The final coffee composition blend preferably contains about 2 to about 30 wt%, more preferably, about 5 to about 25 wt% and, most preferably, about 5 to about 9 wt % of the ground freeze-dried nopal powder.

Referring to the drawing, FIG. 1 depicts a flow chart showing the procedure
25 for manufacturing a nopal pad isolate and coffee composition according to a preferred embodiment of the present invention.

Young nopal pads, i.e., new petal growth pads, are selectively harvested from cactus plants of the *opuntia ficus indica* and/or *opuntia streptacantha lemaire* variety prior to flowering by cutting each leaf (or pad) manually (step S100).

The harvested nopal pads are then washed in a water and chlorine mixture to remove organic debris (step S101).

Next, the washed pads are manually de-thorned (step S102).

5 The de-thorned pads are then soaked in a sodium bicarbonate solution at a pH of about 7.5 for about 10 minutes (step S103).

The de-thorned pads are then roasted in an Excelsior Drum Roaster, at a temperature in the range of about 250°F to about 398°F for a total of about 3-5 minutes with each side being roasted for approximately 1.5-2.5 minutes to a medium dark roast (step S104).

10 The roasted pads are then ground using a hammer mill grinder equipped with steam nozzles to release and dissociate the juice and soluble solid fractions from the insoluble fiber/solid fractions of the pads. Steam is introduced through the steam nozzles to immediately heat the ground nopal material to at least about 160°F, to inactivate the cellulase enzyme that is naturally present in the fresh nopal pads and to
15 reduce the viscosity of the juice/soluble fractions (step S105).

The insoluble pulp is then removed by filtering the juice/soluble fractions using a Brown Model 3900 or 2503 screw type finisher (step S106).

Next, the screened juice/soluble fractions is filtered using a diatomaceous earth (D.E.) filter aide in a plate and frame filter press, in which the D.E. is about
20 10wt% of the filter cake and the filtrate is recycled until the filtrate is a clear juice stream (step S107).

The clear juice is then flash pasteurized at temperature of about 192°F for about 10 seconds (step S108).

Next, water is removed from the juice at room temperature using reverse
25 osmosis to achieve about a 12 to 15 wt% solids concentration (step S109).

Sodium benzoate and/or potassium sorbate are then added as preservatives to the concentrate in amounts to achieve 0.05 wt% sodium benzoate and 0.05 wt% potassium sorbate, based on the total weight of the concentrate (step S110).

Next, the pH of the concentrate is adjusted to about 5.0 (step S111).

The adjusted concentrate is then flash pasteurized at a temperature of about 192°F for about 10 seconds (step S112).

The pasteurized concentrate is then freeze-dried to provide a freeze-dried
5 nopal isolate having a moisture content of less than about 7wt% (step S113).

The freeze-dried nopal isolate is then ground to powder having a particle size in which at least about 100% of the powder passes through a 100 mesh screen (step S114).

The ground powder is then thoroughly blended with roasted ground coffee
10 beans, to provide a blend containing about 5 wt % of the ground freeze-dried nopal powder (step S115).

In another aspect, the invention is more generally directed to a dietary supplement, which includes a nopal cactus isolate derived from the juice and/or soluble solid fractions of nopal pads of the *opuntia ficus indica* and/or *opuntia*
15 *streptacantha lemaire* variety.

In one embodiment, the supplement includes a therapeutically effective amount of the isolate to reduce or maintain weight, to reduce cholesterol, or to both reduce (or maintain) weight and reduce cholesterol. Preferably, the isolate is substantially free of the insoluble solid and fibrous components naturally present in
20 the nopal pads. Preferably, the nopal pad isolate contains less than about 1 wt %, more preferably less than about 0.5 wt %, and most preferably less than about 0.1 wt % of insoluble fiber or solid components. It is also preferred that the yield of isolate from the initial juice, i.e., the juice produced by grinding and removing the insoluble solid and fibrous fractions, is at least about 1%, more preferably 1.5% and most
25 preferably about 2% based on the weight of the juice and soluble solid components.

The nopal pad isolate according to the invention is preferably rich in the pectin, nutrients, flavonoids, glucomannons and polyphenols naturally found in the nopal pads. Preferably, the isolate is prepared in a manner which avoids significant

cleavage or breakdown of the long chain glucomannons and polyphenols found in the juice and soluble solid fractions of the nopal pads.

The isolate is preferably derived from young nopal pads harvested prior to flowering of the plant. Preferably, the nopal pads are roasted in a controlled manner
5 prior to juicing to enhance the flavor of the isolate.

It is contemplated that the isolate can be added to any suitable carrier or edible additive. In one embodiment, the supplement is in liquid form with the isolate being added to any of a variety of water-based foodstuffs, such as drinks, for example, flavored water, juice drinks, sports drinks or drink mixes. Preferably, the supplement
10 is the form of a hot beverage, for example, a brewed or instant tea or coffee. The brewed tea or coffee can be produced by brewing a composition containing tea leaves and the nopal isolate or a composition containing ground coffee and the nopal isolate, respectively. The instant tea or coffee can be produced by freeze-drying or otherwise forming the brewed tea or coffee into a reconstitutable powder that can be
15 reconstituted with hot water. Alternatively, a standard instant tea or coffee can be blended with a reconstitutable nopal isolate powder. Preferably, the supplement is in a form selected from the group consisting of a juice, coffee and tea.

In yet another aspect, the invention is directed to a method for making a dietary supplement, which includes roasting nopal cactus pads of the *opuntia ficus*
20 *indica* and/or *opuntia streptacantha lemaire* cactus variety; grinding the roasted pads; substantially separating juice and soluble solid fractions from insoluble fractions of the ground and roasted pads; and freeze-drying the juice and soluble fractions to form a powder.

The method can include blending the powder with ground roasted coffee
25 beans to provide a composition suitable for brewing coffee. In such a case, the roasting step is preformed under conditions to make the taste compatible with brewed coffee.

The method can also include, prior to freeze-drying, the steps of heating the ground nopal pads to inactivate the cellulase enzyme naturally present in fresh nopal
30 pads; filtering out the insoluble pulp from the nopal pad juice and soluble solid

fractions; filtering the nopal pad juice and soluble solid fractions until the juice becomes clear; pasteurizing the clear juice; concentrating the pasteurized juice to a concentration suitable for freeze-drying; adjusting the pH of the concentrate; and
5 subjecting the concentrate to a second pasteurization step. Preferably, the pH is adjusted to about 5.0. The method can also include adding at least one preservative to the juice. In one embodiment, the method results in yield of the juice and soluble fractions by weight that is at least 30% or greater, preferably at least 40% or greater, and, more preferably, at least 50% or greater of the total weight of the starting nopal pads. Preferably, the yield of the isolate from the juice and soluble solid fraction is at
10 least about 1% or greater, preferably at least about 1.5% or greater, and more preferably at least about 2% or greater of the total weight of the juice and soluble solids.

In another aspect, the invention is directed to a nopal composition which includes a water soluble isolate derived from nopal pads of the *opuntia* genus.
15 Preferably, the nopal pads are of a variety selected from the group consisting of *opuntia ficus indica*, *opuntia streptacantha lemaire* and combinations thereof. Preferably, the isolate is substantially free of active cellulase enzymes.

In a preferred embodiment, the nopal pads are young nopal pads harvested prior to flowering of the cactus plant. Preferably, the nopal pads are roasted in a
20 controlled manner to enhance the flavor of the isolate. Preferably, the isolate is derived from the juice and water soluble solid fractions of the nopal pads and is substantially free of or absent the insoluble fiber and other insoluble fractions of the pads. In one embodiment, the isolate consists essentially of juice and water soluble solid fractions of the nopal pads.

25 Preferably, the nopal pads are young nopal pads harvested prior to flowering of the cactus plant, which are roasted in a controlled manner to enhance the flavor of said isolate, and the isolate is substantially free of active cellulase enzymes. The isolate can be added as an ingredient to a variety of foods or beverages to provide the health benefits of the phytonutrients which are naturally found in the water soluble
30 components of the nopal pads and which are substantially preserved and contained in the isolate.

In a preferred embodiment, the invention is directed to a nopal composition which includes a water soluble solidified isolate derived from nopal pads of the *opuntia* genus. The nopal pads are preferably of a variety selected from the group consisting of *opuntia ficus indica*, *opuntia streptacantha lemaire* and combinations thereof. In one embodiment, the solid isolate consists essentially of juice and water soluble solid fractions of the nopal pads. Preferably, the isolate is freeze-dried.

The nopal pads are preferably young nopal pads harvested prior to flowering of the cactus plant. The nopal pads are also preferably roasted in a controlled manner to enhance the flavor of the isolate. In one embodiment, the isolate is in a form of a dispersion of solid particles. The isolate is preferably rich in phytonutrients naturally found in the water soluble fractions of said nopal pads. These phytonutrients are preferably substantially preserved and concentrated in the isolate. Preferably, the solid isolate has a solubility of at least about 150 g/liter of water, more preferably at least about 200g/liter of water and most preferably about 250g/liter of water (measured at 20°C). In one embodiment, the solid isolate can be reconstituted to a liquid by adding water and mixing.

Typically, the solid isolate is a dispersion of solid particles having a moisture content of less than about 10 wt%. The isolate can be in a form selected from the group consisting of pellets, granules and powder. The solid isolate can be stored for extended periods of time and can be added as an ingredient to a variety of foods or beverages.

The invention is also directed to a comestible that includes a water soluble isolate derived from nopal pads of the *opuntia* genus and at least one other edible ingredient. Preferably, the nopal pads are of a variety selected from the group consisting of *opuntia ficus indica*, *opuntia streptacantha lemaire* and combinations thereof. The comestible can be in a form selected from the group consisting of a drink, including, e.g., flavored water, juice, flavored milk drinks and hot chocolate; powdered drink mix; fruit based or herbal infusion; brewable mixture; soup; yogurt; pudding; chocolate; candy; and ingredients thereof. In one embodiment, the comestible is freeze-dried. Preferably, the isolate is a solid material and, more preferably, a freeze-dried solid material.

Preferably, the comestible contains the isolate in an amount sufficient to provide the health benefits associated with the phytonutrients naturally found in the nopal pads. Preferably, the comestible contains at least about 100mg of the isolate, more preferably at least about 200mg of the isolate and, most preferably, at least
5 about 300mg of the isolate per typical serving size of the comestible. The serving size is preferably the typical serving size specified for the standard nutritional information provided with commercially available food products. A typical serving of a solid comestible food product is preferably a portion containing between about 50 and about 250 calories depending on the comestible, with low or no carbohydrate
10 products, and fat free products, possibly having fewer calories per serving. A typical serving of a comestible beverage product ranges from about 6 to about 16 ounces depending on the product.

In another aspect, the invention is specifically directed to a composition for making tea which includes a nopal cactus isolate and dried leaves, stems and/or buds
15 of the shrub *Camellia sinensis*. Preferably, the nopal cactus isolate is derived from the juice and/or soluble solid fractions of nopal pads of the *opuntia* genus. More preferably, the nopal pads are of a variety selected from the group consisting of *opuntia ficus indica*, *opuntia streptacantha lemaire* and combinations thereof. The nopal cactus isolate is preferably freeze-dried.

20 In one embodiment, the freeze-dried isolate is present in an amount sufficient to enhance weight reduction and/or reduce cholesterol as a result of consuming the tea made from the composition. The composition for making tea preferably contains about 2 to about 30 wt%, more preferably, about 5 to about 25 wt% and, most preferably, about 10 to about 20 wt % of the ground freeze-dried nopal powder.

25 Preferably, the nopal pads are roasted in a controlled manner to enhance the flavor of the isolate and make it compatible with brewed or steeped tea. The composition can be in a form suitable for making tea by a method selected from the group consisting of brewing, steeping, instant tea and flow-through bag. The instant tea composition can be made by combining the nopal isolate with tea leaves and
30 brewing (or steeping) in hot water to produce a tea, followed by freeze drying the resulting tea to provide an instant freeze-dried tea that can be reconstituted with water.

The dried leaves, stems and/or buds of the shrub *Camellia sinensis* can include classifications of teas selected from the group consisting of black tea, green tea, oolong, white tea and blends thereof. Additionally, the dried leaves and/or buds can include specific classifications of teas selected from the group consisting of pu-erh, brick tea, yellow tea, chong cha, kukicha, lapsang souchong, rize tea and blends thereof. In one embodiment, the dried leaves, stems and/or buds of the shrub *Camellia sinensis* are at least partially decaffeinated.

It is also contemplated that the composition for making tea can contain other ingredients that provide additional health benefits or improve the drinking experience. Ingredients that provide additional health benefits can include natural health promoting ingredients, such as, for example, Bitter Orange, Gracinia Cambogia or Kola Nut Extract. Ingredients that improve the drinking experience can include sweeteners, whitening agents or flavorants. Preferred flavorants include fruit flavors, flowers, herbs, spices or natural oils such as rosehip, chamomile, jasmine, cinnamon, mint, peppermint, cardamom, ginger, nut flavors, and oil of bergamot.

In another aspect, the invention is directed to a method for making a water soluble solidified isolate derived from nopal pads of the *opuntia* genus. The method preferably includes roasting the nopal pads; substantially separating insoluble pulp from water soluble solid and juice fractions; and forming a solidified isolate from the soluble solid and juice fractions. The isolate can be prepared according to the steps described above with respect to the coffee composition, however, with the roasting, pH and grinding tailored for the desired end use, i.e., the food or beverage product.

In another aspect, the invention is directed to a method for making a tea composition which includes combining a solid nopal isolate with dried leaves, stems and/or buds of the shrub *Camellia sinensis*. The solid nopal isolate can be prepared as discussed above, but under specific roasting, pH and grinding conditions to achieve an isolate having a taste compatible with the desired tea product. Preferably, the nopal pads are roasted to about a level one (1) or level two (2) roast on the coffee roasting scale and the pH of the isolate is adjusted to substantially match the pH of the resulting tea. For example, for a tea composition containing black tea, the pH is preferably adjusted to about 5. The solid isolate, e.g., a freeze-dried isolate, is

preferably ground to a particle size to maximize the dissolution of the solid isolate under the desired brewing conditions. For a typical flow-through bag tea product, the particle size is preferably about 100 mesh.

In yet another aspect, the invention is directed towards a method for lowering
5 cholesterol, stabilizing blood glucose levels and/or promoting healthy weight management. The method includes administering a nutritional supplement or food stuff which includes a nopal cactus isolate, as described above, to someone in need thereof, in an therapeutically effective amount and at a frequency sufficient to lower cholesterol, stabilize blood glucose and insulin levels and/or promote healthy weight
10 management. Preferably, the nutritional supplement or food stuff in the form of coffee made from the composition for making coffee discussed above.

Preferably, the person in need of lowering cholesterol, stabilizing blood glucose levels or weight reduction (or stabilization) will consume between about 2 and 4 cups of coffee made from the composition, as described above. The
15 effectiveness of the composition in lowering cholesterol, stabilizing blood glucose levels and promoting weight management is generally dependent upon the individuals body weight and physiology. Thus, the amount administered will be dependent upon the individual's needs.

In another aspect, the invention is directed to an item of manufacture that
20 includes a container containing a comestible which includes a water soluble isolate derived from nopal pads of the opuntia genus, wherein the container is associated with printed labeling or contents information advising of attributes or benefits of the nopal isolate. These attributes or benefits can include lowering cholesterol, stabilizing blood glucose levels, stabilizing blood insulin levels, reducing weight, maintaining
25 weight and combinations thereof. The attributes can also include caloric of compositional data, e.g., the number of calories of the isolate or the product containing the isolate, or the amount of isolate present.

The invention is also specifically directed to an item of manufacture which includes a container containing a coffee composition, that includes a blend of ground
30 roasted coffee and a nopal cactus isolate, wherein the container is associated with printed labeling advising of the attributes or benefits of the coffee composition or an

ingredient thereof, e.g., nopal cactus. The attributes or benefits can include lowering cholesterol, stabilizing blood glucose levels or reducing (or maintaining) weight by consuming coffee made from the coffee composition.

EXAMPLES

5 The following non-limiting examples have been carried out to illustrate preferred embodiments of the invention. These examples include the preparation of a nopal pad isolate, a coffee product, evaluations of the coffee product according to the invention and anticipated benefits of the products according to the invention.

EXAMPLE 1

10 The following example relates to a method for preparing a nopal pad isolate according to the invention. Approximately one metric ton (about 2,200 pounds) of young nopal pads of the *opuntia ficus indica* variety were manually harvested. The nopal pads were washed in a water and chlorine mixture to remove organic debris. The nopal pads were then de-thorned manually. The de-thorned pads were then
15 soaked in a sodium bicarbonate solution having a pH of about 7.5 for about 10 minutes.

 After soaking, the pads were roasted in an Drum Roaster, Probat Model Excelsior, at a temperature of about 375° F for about 3 minutes. The roasted pads were inspected to ensure a medium dark roast, i.e., a level 2 roast on the coffee
20 roasting scale.

 The roasted nopal pads were ground using a Ritz disintegrator hammer mill grinder, Model No. RP12, equipped with steam nozzles. The nopal material was immediately steam heated to a temperature of about 160° F by introducing steam through the steam nozzles.

25 The insoluble pulp was separated from the juice by filtering the juice using a Brown Model No. 3900 screw type finisher. Approximately 130 gallons of juice was obtained. The resulting juice was passed through a plate and frame filter press containing a diatomaceous earth (D.E.) filter aide. The D.E. accounted for about 10

wt % of the filter cake. The juice stream was recycled until the juice coming out was clear.

The clear juice was then flash pasteurized using an APV plate heat exchanger at a temperature of about 192° F for about 10 seconds. Water was then removed from the clear juice using an Osmonix reverse osmosis system, having a maximum flow rate of about 5 gpm at 700 psi, to achieve about a 12 wt. % solids concentration.

Sodium benzoate and potassium sorbate were added to the concentrate to achieve about 0.05% sodium benzoate and 0.05% potassium sorbate, based on the weight of the concentrate. The pH was then adjusted to about 5 using citric acid. The adjusted concentrate was again flash pasteurized at about 192°F for about 10 seconds.

The pasteurized concentrate was then freeze dried using a Cuddon FD 80 freeze dryer to produce approximately 22 pounds of a freeze dried powder having a moisture content of about 6 wt %.

The freeze dried nopal isolate powder was then ground using a Fitzmill Model D grinder to a particle size such that essentially 100% of the particles would pass through a 100 mesh screen. Approximately 22 pounds of the nopal isolate powder were obtained.

EXAMPLE 2

The following example relates to a method for preparing a composition for making coffee according to the invention. Approximately 1,200 grams of roasted coffee beans were ground to a size suitable for making automatic drip coffee. The ground coffee beans were combined with approximately 60 grams of the freeze dried nopal isolate powder from Example 1 and were thoroughly blended using a Ross Ribbon Blender Model 42N.

25

EXAMPLE 3

This example relates to a method for preparing coffee according to the invention. Approximately, 75.6 grams of the coffee/nopal isolate blend from Example 2 were placed in a standard coffee filter and brewed into coffee using a

Krups automatic drip coffee maker. Approximately 6 cups, containing about 6 oz. per cup, of a coffee beverage were produced.

The resulting coffee was palatable and had an acceptable taste and flavor expected for a coffee drinking experience.

5

EXAMPLE 4

Three groups of laboratory rats are each fed with a blend of 0.25% cholesterol and 2 g coffee. In each test group the concentration of nopal isolate in the coffee is varied so that the coffee contains approximately 0%, 3% and 5%, respectively. Serum total cholesterol and lipoprotein profile is determined for each group. After one
10 month feeding, blood is withdrawn and serum total cholesterol, HDL and LDL is determined. Rats receiving a 5% nopal isolate-coffee blend have lower weight gain when compared with counterparts being fed 3% or the control 0%. Consumption of diet with coffee with 0% nopal isolate have essentially no affect on total cholesterol and LDL cholesterol levels, however rats fed with freeze dried nopal isolate at 5%
15 concentration levels have a significant, e.g. 34%, reduction of LDL cholesterol levels. Consumption of nopal isolate has no affect on HDL cholesterol levels. Thus, it can be concluded that the freeze dried nopal isolate has potentially beneficial effect for hypercholesterolemia individuals.

EXAMPLE 5

20 The effect of nopal soluble fiber vs. nopal soluble fiber and coffee blend on low density lipoprotein (LDL) metabolism is investigated by feeding 8 men with dyslipidemia either a diet containing 5% nopal isolate freeze dried juice concentrate mixed in water with no coffee or 5% nopal isolate freeze dried juice concentrate blended in hot coffee. After 6 weeks, blood is withdrawn and plasma cholesterol
25 profile is analyzed. Cholesterol levels are believed to be significantly decreased by the nopal isolate/coffee blend diet, e.g., a 36% decrease in LDL levels and hepatic free and esterified cholesterol levels reduced 33%. The 5% nopal isolate freeze dried juice concentrate in water with no coffee shows a significantly smaller decrease, e.g., only a 28% decrease in LDL levels and hepatic free and esterified cholesterol levels

only reduced by 30%. These data suggest that nopal isolate taken with hot coffee is more effective in lowering cholesterol than nopal isolate with no coffee.

EXAMPLE 6

Five to fifty men are selected for clinical study. The men are considered
5 obese, i.e., having a Body Mass Index ("BMI") in excess of 30. BMI is calculated by
dividing a person's weight (in lbs) by their height (in inches) and multiplying by
704.5. All the men in the study are restricted to a controlled diet, in which the total
amount of calories, carbohydrates and fats are approximately the same for each
subject. The men are divided into four groups, the first of which receives 2 servings
10 of regular instant coffee per day (with a serving being about 4.5 grams of regular
instant coffee mixed with 6 ounces of hot water, the second of which receives 2
servings of the nopal pad isolate per day (with a serving being about 0.5 grams of the
isolate mixed with 6 ounces of hot water), the third of which receives 2 servings of
nopal isolate enriched coffee (with a serving being about 4.5 grams of instant regular
15 instant coffee and about 0.5 grams of the nopal isolate mixed with 6 ounces of hot
water), and the fourth of which receives no supplement (the "control" group). The
diets of the groups are selected to include no further source of weight loss or diet
supplements. The diets are continued for 6 months.

Prior to beginning the diets, the subjects are weighed. The subjects are
20 weighed again for each group after the groups have been on the respective diets for 6
months. The results are compared between members of each group and between the
beginning of the study and end of the study for each member. Enhanced weight loss
by the combination of the coffee and nopal isolate is shown by a greater percent
decrease weight in the combination group relative to the coffee group, the nopal
25 isolate group, and the control group.

Utility of the combination of the coffee and nopal isolate for weight loss in a
human is evidenced by activity in the above example.

EXAMPLE 7

Approximately 2.0 grams of black tea is combined with approximately 300
30 mg of the freeze dried nopal isolate powder from Example 1 and thoroughly blended.

The tea blend is placed in a flow through tea bag. The filled bag can be used to make a 6 to 8 oz. cup of tea.

EXAMPLE 8

Food items selected from juices, powdered drink mixes, fruit based or herbal
5 infusions, soups, yogurts, puddings, chocolate and candy produced by adding
approximately 0.1 to about 30 wt % of the freeze dried nopal isolate powder from
Example 1 as an ingredient in the respective food item.

While reference has been made to various preferred embodiments of the
invention other variations, implementations, modifications, alterations and
10 embodiments are comprehended by the broad scope of the appended claims. Some of
these have been discussed in detail in this specification and others will be apparent to
those skilled in the art. Those of ordinary skill in the art having access to the
teachings herein will recognize these additional variations, implementations,
modifications, alterations and embodiments, all of which are within the scope of the
15 present invention, which invention is limited only by the appended claims.

**THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE
PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:**

1. A nopal composition comprising a water soluble isolate derived from nopal pads of the *opuntia* genus, wherein said isolate contains a higher concentration
5 of phytonutrients compared to the concentration of phytonutrients naturally found in the juice and water soluble fractions of said nopal pads, wherein said isolate is substantially free of active cellulase enzymes, and wherein said nopal pads are roasted in a controlled manner to enhance the flavor of said isolate.
2. The composition according to claim 1, wherein said nopal pads are of a
10 variety selected from the group consisting of *opuntia ficus indica*, *opuntia streptacantha lemaire* and combinations thereof.
3. The composition according to claim 1, wherein said nopal pads are young nopal pads harvested prior to flowering of the cactus plant.
4. The composition according to claim 1, wherein said isolate consists
15 essentially of juice and water soluble solid fractions of said nopal pads.
5. A nopal composition comprising a water soluble solidified isolate derived from nopal pads of the *opuntia* genus, wherein said nopal pads are roasted in a controlled manner to enhance the flavor of said isolate.
6. The composition according to claim 5, wherein said nopal pads are of a
20 variety selected from the group consisting of *opuntia ficus indica*, *opuntia streptacantha lemaire* and combinations thereof.
7. The composition according to claim 5, wherein said isolate consists essentially of juice and water soluble solid fractions of said nopal pads.
8. The composition according to claim 5, wherein said isolate is freeze-
25 dried.
9. The composition according to claim 5, wherein said nopal pads are young nopal pads harvested prior to flowering of the cactus plant.

10. The composition according to claim 5, wherein said isolate is in a form of a dispersion of solid particles.

11. The composition according to claim 10, wherein said isolate has a moisture content of less than about 10 wt%.

5 12. The composition according to claim 5, wherein said isolate is rich in phytonutrients naturally found in the water soluble fractions of said nopal pads.

13. The composition according to claim 5, wherein said isolate has a solubility of at least about 150g/liter of water (measured at 20°C).

10 14. The composition according to claim 13, wherein said isolate has a solubility of at least about 200g/liter of water (measured at 20°C).

15. The composition according to claim 14, wherein said isolate has a solubility of about 250g/liter of water (measured at 20°C).

15 16. The composition according to claim 6, wherein said nopal pads are young nopal pads harvested prior to flowering of the cactus plant, which are roasted in a controlled manner to enhance the flavor of said isolate, and wherein said isolate is freeze-dried.

17. The composition according to claim 16, wherein said isolate is in a form of a dispersion of solid particles having a moisture content of less than about 10 wt%.

20 18. The composition according to claim 17, wherein said isolate is in a form selected from the group consisting of pellets, granules and powder.

19. The composition according to claim 18, wherein said isolate has a solubility of at least about 200g/liter of water (measured at 20°C).

25 20. The composition according to claim 19, wherein said isolate has a solubility of about 250g/liter of water (measured at 20°C).

21. A comestible comprising a water soluble isolate derived from nopal pads of the *opuntia* genus and at least one other edible ingredient, wherein said isolate

contains a higher concentration of phytonutrients compared to the concentration of phytonutrients naturally found in the juice and water soluble fractions of said nopal pads, wherein said isolate is substantially free of active cellulase enzymes, and wherein said nopal pads are roasted in a controlled manner to enhance the flavor of said isolate.

22. The comestible according to claim 21, wherein said nopal pads are of a variety selected from the group consisting of *opuntia ficus indica*, *opuntia streptacantha lemaire* and combinations thereof.

23. The comestible according to claim 22, wherein said comestible is in a form selected from the group consisting of a drink, powdered drink mix, fruit or herbal infusion, brewable mixture, soup, yogurt, pudding, chocolate, candy and an ingredient thereof.

24. The comestible according to claim 22, wherein said comestible is freeze-dried.

25. The comestible according to claim 22, wherein said isolate is freeze-dried.

26. A composition for making coffee comprising a nopal cactus isolate derived from nopal pads of the *opuntia* genus and roasted ground coffee beans, wherein said nopal cactus isolate is derived from the juice and/or soluble solid fractions of nopal pads of the *opuntia* genus, and wherein said nopal pads are roasted in a controlled manner to enhance the flavor of said isolate.

27. The composition according to claim 26, wherein said nopal pads are of a variety selected from the group consisting of *opuntia ficus indica*, *opuntia streptacantha lemaire* and combinations thereof.

28. The composition according to claim 26, wherein said nopal cactus isolate is freeze-dried.

29. The composition according to claim 28, wherein said freeze-dried isolate is present in an amount sufficient to enhance weight reduction as a result of consuming said coffee.

30. The composition according to claim 28, wherein said freeze-dried isolate is present in an amount sufficient to reduce cholesterol as a result of consuming said coffee.

31. The composition according to claim 28, wherein said nopal pads are
5 young nopal pads harvested prior to flowering of the cactus plant.

32. The composition according to claim 26, wherein said enhanced flavor is compatible with brewed coffee.

33. The composition according to claim 26, wherein said composition is in a form suitable for making coffee by a method selected from the group consisting of
10 drip, percolation, press, espresso, latte, instant coffee and flow-through bag.

34. The composition according to claim 33, wherein said coffee is intended to be served hot.

35. A composition for making tea comprising a nopal cactus isolate derived from the juice and/or soluble solid fractions of nopal pads of the *opuntia*
15 genus and dried leaves, stems and/or buds of the shrub *camellia sinensis*, wherein said nopal pads are roasted in a controlled manner to enhance the flavor of said isolate.

36. The composition according to claim 35, wherein said nopal pads are of a variety selected from the group consisting of *opuntia ficus indica*, *opuntia streptacantha lemaire* and combinations thereof.

20 37. The composition according to claim 35, wherein said nopal cactus isolate is freeze-dried.

38. The composition according to claim 37, wherein said freeze-dried isolate is present in an amount sufficient to enhance weight reduction as a result of consuming tea made from said composition for making tea.

25 39. The composition according to claim 37, wherein said freeze-dried isolate is present in an amount sufficient to reduce cholesterol as a result of consuming tea made from said composition for making tea.

40. The composition according to claim 35, wherein said nopal pads are young nopal pads harvested prior to flowering of the cactus plant.

41. The composition according to claim 35, wherein said enhanced flavor is compatible with brewed tea.

5 42. The composition according to claim 35, wherein said composition is in a form suitable for making tea by a method selected from the group consisting of brewing, steeping, instant tea and flow-through bag.

43. The composition according to claim 42, wherein said instant tea is freeze dried.

10 44. The composition according to claim 42, wherein tea made from said composition is intended to be served hot.

45. The composition according to claim 35, wherein said dried leaves, stems and/or buds of the shrub *Camellia sinensis* is a classification of tea selected from the group consisting of black tea, green tea, oolong, white tea and blends
15 thereof.

46. A dietary supplement, comprising a nopal cactus isolate derived from the juice and/or soluble solid fractions of nopal pads of the *opuntia ficus indica* and/or *opuntia streptacantha lemaire* variety, wherein said nopal pads are roasted to enhance the flavor of said isolate.

20 47. The dietary supplement according to claim 46, wherein said supplement comprises an effective amount of said isolate to reduce or maintain weight.

48. The dietary supplement according to claim 46, wherein said supplement comprises an effective amount of said isolate to reduce cholesterol.

25 49. The dietary supplement according to claim 46, wherein said isolate is derived from young nopal pads harvested prior to flowering of the plant.

50. The dietary supplement according to claim 46, wherein said supplement is in liquid form.

51. The dietary supplement according to claim 50, wherein said supplement is in a form selected from the group consisting of flavored water, juice,
5 coffee and tea.

52. A method for making a water soluble solidified isolate derived from nopal pads of the *opuntia* genus, said method comprising:

- (i) roasting said nopal pads;
- (ii) substantially separating insoluble pulp from water soluble solid and
10 juice fractions; and
- (iii) forming said water soluble solidified isolate from said soluble solid and juice fractions.

53. The method according to claim 52, wherein said nopal cactus pads are (i) cleaned and de-thorned before roasting and (ii) ground after roasting for releasing
15 nopal pad juice and soluble solids.

54. The method according to claim 53, wherein said de-thorned pads are soaked in a basic solution before roasting.

55. The method according to claim 53, wherein said grinding of said pads is accomplished by using a hammer mill grinder.

20 56. The method according to claim 53, wherein said ground nopal pads are heated sufficiently to substantially inactivate cellulase enzyme naturally present in nopal pads prior to separating insoluble pulp from said juice and soluble solid fractions.

57. The method according to claim 56, wherein said heating is
25 accomplished by steam heating said ground nopal pads to about 160°F.

58. The method according to claim 56, wherein said heating is accomplished by steam heating said ground nopal pads immediately after grinding.

59. The method according to claim 56, wherein said heating is accomplished by simultaneously steam heating and grinding said nopal pads.

60. The method according to claim 52, wherein said separating step is accomplished by filtering said insoluble pulp out of said juice and soluble solid
5 fractions.

61. The method according to claim 52, which further comprises pasteurizing said juice and soluble solids fractions.

62. The method according to claim 61, wherein said pasteurization is accomplished by flash pasteurizing said juice at a temperature of at least about 190°F
10 for about 10 seconds.

63. The method according to claim 61, which further comprises concentrating said pasteurized juice and soluble solid fractions.

64. The method according to claim 63, wherein said concentrating step results in a concentrate suitable for freeze-drying.

15 65. The method according to claim 64, wherein said concentrating step is accomplished by using reverse osmosis to concentrate the juice to about a 12% solids concentration.

66. The method according to claim 63, which further comprises adjusting the pH of said concentrated juice and soluble solids to a desired end use pH.

20 67. The method according to claim 66, wherein said concentrate is adjusted to a pH of about 5.0.

68. The method according to claim 67, which further comprises subjecting said adjusted concentrate to a second pasteurization step.

25 69. The method according to claim 68, wherein said second pasteurization step is carried out by flash pasteurizing said concentrate at a temperature of at least about 190°F for about 10 seconds.

70. The method according to claim 52, which further comprises filtering said juice and soluble solid fractions to provide a substantially clear liquid.

71. The method according to claim 70, wherein said filtering step is accomplished by recycling said juice through a diatomaceous earth filter.

5 72. The method according to claim 70, which further comprises pasteurizing said substantially clear fluid.

73. The method according to claim 70, which further comprises adjusting the pH of said substantially clear liquid to a desired end use pH.

74. The method according to claim 70, which further comprises
10 concentrating said pasteurized clear liquid to a concentrate suitable for freeze-drying.

75. The method according to claim 74, which further comprises subjecting said adjusted concentrate to a second pasteurization step.

76. The method according to claim 52, further comprising adding at least one preservative to the nopal juice prior to solidifying.

15 77. The method according to claim 52, wherein said solidified isolate is in the form of a freeze-dried powder.

78. The method according to claim 77, wherein said freeze-dried powder has a moisture content of less than about 7%.

79. The method according to claim 77, wherein said freeze-dried powder is
20 ground to a pre-selected particle size.

80. The method according to claim 79, wherein said freeze-dried nopal powder is ground to a granule size of about 100 mesh.

81. A method of making a coffee composition comprising blending a water soluble solid nopal isolate derived from nopal pads of the *opuntia* genus with ground
25 coffee beans, wherein said isolate is prepared by (i) roasting nopal cactus pads of the *opuntia ficus indica* and/or *opuntia streptacantha lemaire* variety to enhance the flavor of coffee prepared from said coffee composition; (ii) substantially separating

insoluble pulp from soluble solids and nopal pad juice; (iii) concentrating said juice and soluble solids; and (iv) freeze-drying said concentrate to form a powder.

82. The method according to claim 81, wherein nopal cactus pads are (i) cleaned and de-thorned before roasting and (ii) ground after roasting for releasing
5 nopal pad juice and soluble solids.

83. The method according to claim 82, wherein said de-thorned pads are soaked in a basic solution before roasting.

84. The method according to claim 82, wherein said roasting step includes roasting said pads to achieve about a level 2 roast, on the coffee roasting scale.

10 85. The method according to claim 82, wherein said grinding of said pads is accomplished by using a hammer mill grinder.

86. The method according to claim 82, wherein said ground nopal pads are heated sufficiently to substantially inactivate cellulase enzyme naturally present in nopal pads prior to separating insoluble pulp from said juice and soluble solid
15 fractions.

87. The method according to claim 86, wherein said heating is accomplished by steam heating said ground nopal pads to about 160°F.

88. The method according to claim 86, wherein said heating is accomplished by steam heating said ground nopal pads immediately after grinding.

20 89. The method according to claim 86, wherein said heating is accomplished by simultaneously steam heating and grinding said nopal pads.

90. The method according to claim 81, wherein said separating step is accomplished by filtering said insoluble pulp out of said juice and soluble solid fractions.

25 91. The method according to claim 81, which further comprises pasteurizing said juice and soluble solids fractions.

92. The method according to claim 91, wherein said pasteurization is accomplished by flash pasteurizing said juice at a temperature of at least about 190°F for about 10 seconds.

93. The method according to claim 92, which further comprises
5 concentrating said pasteurized juice and soluble solid fractions to a concentrate suitable for freeze-drying.

94. The method according to claim 93, wherein said concentrating step is accomplished by using reverse osmosis to concentrate the juice to about a 12% solids concentration.

10 95. The method according to claim 81, which further comprises adjusting the pH of said concentrated juice and soluble solids to substantially match the pH of coffee.

96. The method according to claim 95, wherein said concentrate is adjusted to a pH of about 5.0.

15 97. The method according to claim 96, which further comprises subjecting said adjusted concentrate to a second pasteurization step.

98. The method according to claim 97, wherein said second pasteurization step is carried out by flash pasteurizing said concentrate at a temperature of at least about 190°F for about 10 seconds.

20 99. The method according to claim 81, which further comprises filtering said juice and soluble solid fractions to provide a substantially clear liquid.

100. The method according to claim 99, wherein said filtering step is accomplished by recycling said juice through a diatomaceous earth filter.

101. The method according to claim 99, which further comprises
25 pasteurizing said substantially clear fluid.

102. The method according to claim 99, which further comprises adjusting the pH of said substantially clear liquid to substantially match the pH of coffee.

103. The method according to claim 99, which further comprises concentrating said pasteurized clear liquid to a concentrate suitable for freeze-drying.

104. The method according to claim 103, which further comprises subjecting said adjusted concentrate to a second pasteurization step.

5 105. The method according to claim 81, further comprising adding at least one preservative to the nopal juice prior to freeze-drying.

106. The method according to claim 81, wherein said freeze-dried powder has a moisture content of less than about 7%.

10 107. The method according to claim 81, wherein said freeze-dried powder is ground to a selected size prior to blending with said ground coffee beans.

108. The method according to claim 107, wherein said freeze-dried nopal powder is ground to a granule size of about 100 mesh.

109. The method according to claim 81, wherein said blend contains about 2 to about 30 wt% of said ground freeze-dried nopal powder.

15 110. The method according to claim 109, wherein said blend contains about 5 to about 25% of said ground freeze-dried nopal powder.

111. A method for making a tea composition comprising:
combining a water soluble solid nopal isolate derived from nopal pads of the *opuntia* genus with dried leaves, stems and/or buds of the shrub *camellia sinensis*, wherein said nopal isolate is prepared by: (i) roasting nopal cactus pads of the *opuntia* genus; (ii) grinding said roasted pads; (iii) substantially separating a juice and soluble solid fractions from insoluble fractions of said ground and roasted pads; (iv) concentrating said juice and solid soluble solids; and (v) freeze-drying the concentrate to form a freeze dried solid.

20

25 112. The method according to claim 111, wherein said nopal pads are of a variety selected from the group consisting of *opuntia ficus indica*, *opuntia streptacantha lemaire* and combinations thereof.

113. The method according to claim 111, further comprising blending said freeze-dried isolate with dried leaves, stems and/or buds of the shrub *Camellia sinensis* to provide a composition suitable for brewing tea.

114. The method according to claim 113, wherein said roasting step is
5 preformed under conditions to make the taste compatible with brewed tea.

115. The method according to claim 111, further comprising, prior to freeze-drying:

heating said ground nopal pads to inactivate the cellulose enzyme naturally present in fresh nopal pads;

10 filtering out the insoluble pulp from the nopal pad juice and soluble solid fractions;

filtering the nopal pad juice and soluble solid fractions until the juice becomes clear;

flash pasteurizing said clear juice;

15 concentrating said pasteurized juice to a concentration suitable for freeze-drying;

adjusting the pH of said concentrate; and

subjecting said concentrate to a second flash pasteurization step.

116. The method according to claim 115, wherein said pH is adjusted to
20 about 5.0.

117. The method according to claim 115, further comprising adding at least one preservative to said juice.

118. A use of a nutritional supplement or food stuff comprising a nopal cactus isolate, in a human, in a therapeutically effective amount and at a frequency
25 sufficient to lower cholesterol, stabilize blood glucose and insulin levels and/or promote healthy weight management in said human, wherein said nopal cactus isolate is derived from the juice and/or soluble solid fractions of nopal pads of the *opuntia ficus indica* and/or *opuntia streptacantha lemaire* variety, and wherein said nopal pads are roasted in a controlled manner to enhance the flavor of said isolate.

119. The use according to claim 118, wherein said nutritional supplement or food stuff in the form of coffee.

120. The use according to claim 119, wherein said coffee is formulated for administering said therapeutically effective amount to said person in about 2 to 4 cups
5 of said coffee per day.

121. An item of manufacture comprising a container containing a coffee composition, said coffee composition comprising a blend of ground roasted coffee and a nopal cactus isolate derived from nopal pads of the *opuntia* genus, wherein the container is associated with printed labeling advising of attributes or benefits of the
10 coffee composition or an ingredient thereof, and wherein said nopal pads are roasted in a controlled manner to enhance the flavor of said isolate.

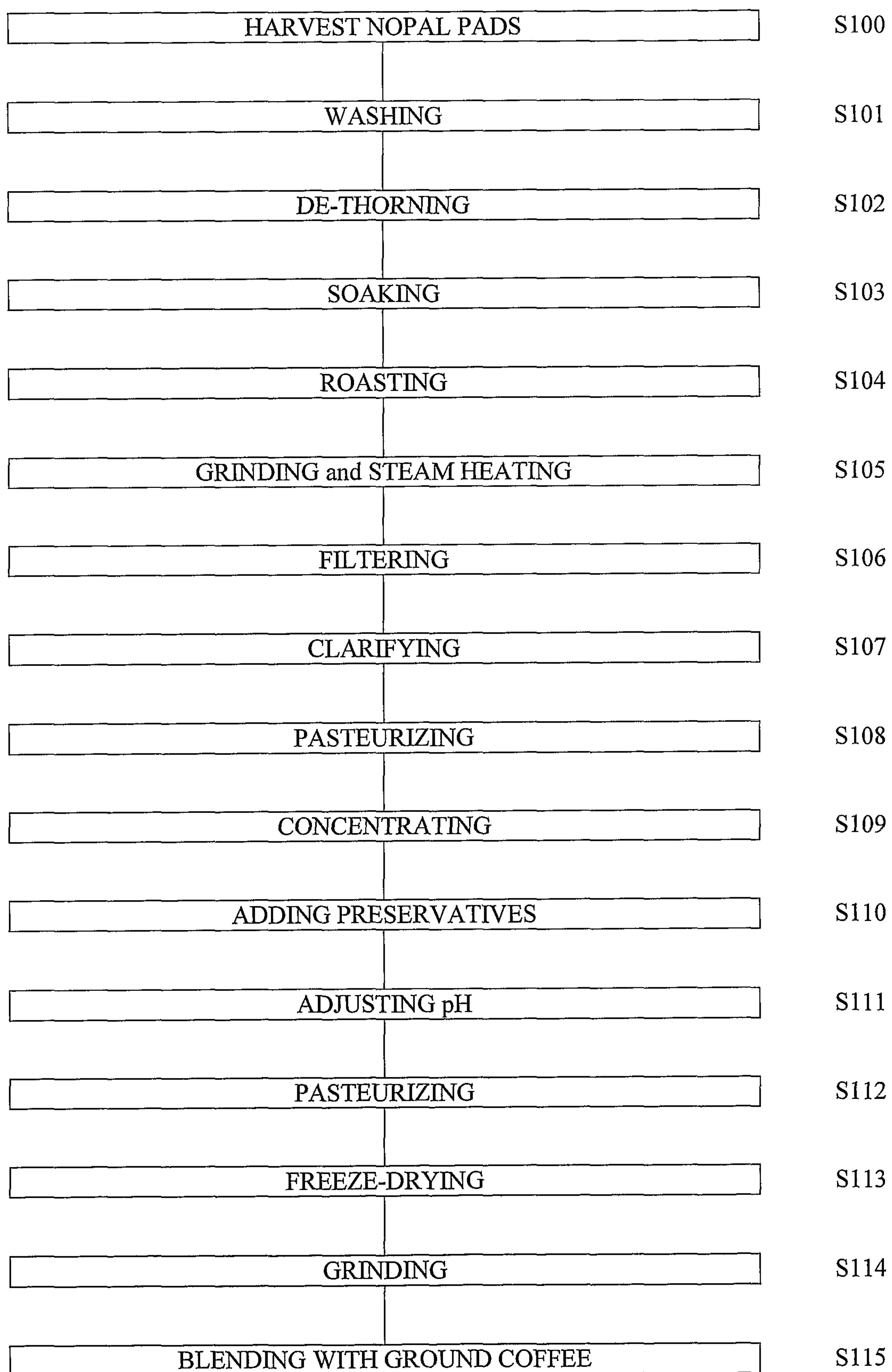
122. The item of manufacture according to claim 121, wherein said attributes or benefits are selected from the group consisting of lowering cholesterol, stabilizing blood glucose levels, stabilizing blood insulin levels, reducing weight,
15 maintaining weight and combinations thereof.

123. An item of manufacture comprising a container containing a comestible which includes a water soluble isolate derived from nopal pads of the *opuntia* genus, wherein the container is associated with printed labeling or contents information advising of attributes or benefits of the nopal isolate or said comestible,
20 and wherein said nopal pads are roasted in a controlled manner to enhance the flavor of said isolate.

124. The item of manufacture according to claim 123, wherein said attributes or benefits are selected from the group consisting of lowering cholesterol, stabilizing blood glucose levels, stabilizing blood insulin levels, reducing weight,
25 maintaining weight and combinations thereof.

125. The item of manufacture according to claim 123, wherein said attributes are selected from the group consisting of caloric and compositional data.

FIG. 1



HARVEST NOPAL PADS	S100
WASHING	S101
DE-THORNING	S102
SOAKING	S103
ROASTING	S104
GRINDING and STEAM HEATING	S105
FILTERING	S106
CLARIFYING	S107
PASTEURIZING	S108
CONCENTRATING	S109
ADDING PRESERVATIVES	S110
ADJUSTING pH	S111
PASTEURIZING	S112
FREEZE-DRYING	S113
GRINDING	S114
BLENDING WITH GROUND COFFEE	S115