



(51) International Patent Classification:

A23L 2/02 (2006.01) A23L 2/08 (2006.01)
A23L 2/04 (2006.01)

(21) International Application Number:

PCT/US2015/039810

(22) International Filing Date:

9 July 2015 (09.07.2015)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

14/329,755 11 July 2014 (11.07.2014) US

(71) Applicant: **BLENDFRESH, LLC** [US/US]; 1206 South
1680 West, Orem, Utah 84058 (US).

(72) Inventors: **SMITH, Jake**; 1212 North 300 East, Pleasant
Grove, Utah 84062 (US). **WASDEN, Jeff**; 1633 East 1160
South, Springville, Utah 84663 (US). **BELTRAN,
Christine**; 1114 South 480 West, Salem, Utah 84653 (US).

(74) Agent: **FOSTER, L. Grant**; Holland & Hart LLP, P.O.
Box 11583, 222 S. Main Street, Suite 2200, Salt Lake City,
Utah 84147 (US).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,

BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG,
MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,
PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC,
SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ,
TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU,
TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE,
DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU,
LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,
SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a
patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the
earlier application (Rule 4.17(iii))

Published:

- with international search report (Art. 21(3))

(54) Title: FRUIT AND VEGETABLE-BASED FORMULATIONS AND METHODS AND USES THEREOF

(57) Abstract: This application concerns compositions including at least one whole or partial food fruit component and/or at least one whole or partial food vegetable component. Also, methods for preparing a fruit and vegetable-based food product formulation for animal or human consumption including blending said composition and a liquid in a blender to form a slurry. Further, uses of said composition as a nutritional source or supplement for humans or animal.



FRUIT AND VEGETABLE-BASED FORMULATIONS AND METHODS AND USES THEREOF

[1] Throughout this application, several publications (including, without limitation, patents) are referenced herein. Disclosure of these publications in their entirety is hereby incorporated by reference in this application.

TECHNICAL FIELD

[2] The present invention relates generally to the field of nutrition and in particular food product formulations based on fruit and/or vegetables for animal or human consumption, and methods and uses thereof. More particularly, the present invention relates to novel compositional blends of whole or partial food fruit and vegetables combined by pigment and/or phytonutrients compositions.

BACKGROUND

[3] The majority of Americans do not consume the recommended quantity of fruits and vegetables, according to the Centers for Disease Control. Consuming an adequate amount and variety of colorful raw whole foods has been shown to mitigate and prevent disease. The guidelines contained in the Centers for Disease Control booklet titled “Strategies to Prevent Obesity and Other Chronic Diseases” recommends five servings daily of fruits and vegetables. However, over 90% of American adults eat less than 1 fruit or vegetable a day. To achieve optimal health, plant foods should comprise 80% of dietary intake.

[4] Additionally, the colors associated with each fruit or vegetable have a specific purpose for the animal or human body. Each fruit or vegetable includes naturally occurring phytochemicals and/or pigments which each have its own mechanism of action and function. For example, mangiferin which has a distinctive gold-orange fluorescent color is naturally occurring in mangoes and has shown to exert antitumor activity in breast cancer cells. See, *e.g.*, Li, et al, “Mangiferin exerts antitumor activity in breast cancer cells by regulating matrix metalloproteinases, epithelial to mesenchymal transition, and β -catenin signaling pathway”, *Toxicol. Appl. Pharmacol.*, 2013 Oct 1;272(1):180-90. doi: 10.1016/j.taap.2013.05.011. Epub 2013 May 22.

[5] Additionally, beta-carotene, a precursor to Vitamin A, is an essential nutrient that makes carrots orange, and has demonstrated to correct myopathy, improve visual acuity and

prevent age related acuity and focus. Other nutrients include lycopene (which gives the red/pink color in tomatoes), lutein (related to greens), resveratrol (found in grapes), ellagic acid, kaempferol, catechins, tiliroside, ferulic acid, caffeic acid terpenoids, indole, and many others. In terms of variety, it is recommended that persons should eat at least three different colors of fruits and vegetables daily to get the phytonutrients found in colorful fruits and vegetables. Colorful fruits and vegetables are the key feature of any diet in providing disease-fighting compounds. Additionally, it is recommended that each person should consume at least 3 servings per week of vegetable protein in the form of legumes, nuts, or seeds.

[6] Consumption of fruits and vegetables has also been shown to mitigate or ameliorate the risks of more serious health conditions. For example, in a recent prospective cohort study of 41,837 postmenopausal women, the association of fruit and vegetable consumption with lung cancer risk was investigated. Researchers found that the risk of lung cancer was cut in half when the consumption of fruits and vegetables increased from 24 or less servings to an excess of 48 servings per week. Similarly, the risk of lung cancer was also cut in half when the consumption of green leafy vegetables, including spinach and parsley sources, increased from 1 or fewer servings to 6 or more servings per week. Steinmetz, K. et al., "Vegetables, Fruit, and Lung Cancer in the Iowa Women's Health Study," *Cancer Res.* 53:536-43 (1993). Another study found that an increased intake of fresh tomatoes (a major source of lycopene) was associated with a pattern of protection for all sites of digestive tract cancer. Stahl, W. et al., "Lycopene: A Biologically Important Carotenoid for Humans?" *Arc. Biochem. Biophys.* 336:1-9 (1996).

[7] Additionally, studies have also shown that diets high in plant foods are associated with reduced risk of various types of cancers. These studies correlate diets rich in fruits and vegetables and nutrients from these diets, such as vitamin C, vitamin A, and dietary fiber, with reduced cancer risk. Persons consuming these diets frequently have high intakes of these nutrients.

[8] There are many barriers that prevent consumption of the recommended number of fruits and vegetables. Geographically, there are fruit and vegetable-deprived areas where people live who are not adequately nourished or do not have access to colorful fruits and vegetables that are stable and still retain their color, potency and nutrient density. Further,

fruits and vegetables spoil quickly because they often have a high water content allowing mold, bacteria and fungus to grow rapidly. Finally, many households do not use up the fruits and vegetables they buy. Once picked or prepared, many consumers are unable to use up the entirety of a fruit or vegetable because of the short shelf life of the produce.

[9] There remains a need, therefore, for convenient vehicles for raw whole or partial fruits and veggies, which have potent essential nutrients, pigments and phytonutrients high in biomedically active plant nutrients, but that are stable and have a lengthy shelf-life.

DISCLOSURE OF THE INVENTION

[10] The present invention is based on the discovery of compositions of whole or partial food fruits and/or vegetables combined by pigment and/or phytonutrients, and developed to address the problems with existing delivery of fruits and vegetables outlined above.

[11] In one aspect, the present invention provides compositions comprising at least one whole or partial food fruit component and at least one whole food vegetable component, wherein both the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component which have the same or similar pigment group selected from the group consisting of red, yellow/orange, purple/blue, green, black, and white. The at least one whole or partial food fruit component and the at least one whole or partial food vegetable component can be juiced or pureed, combined, and then dehydrated using Fresh Dried™ technology or any drying/dehydrating technology presently known in the art or discussed below.

[12] In another aspect, the composition can comprise at least 10 separate whole or partial fruit or vegetable components, or, in further aspects, at least 12 separate whole or partial fruit or vegetable components. The drying/dehydration can, in some embodiments, be achieved using rapid zone drying, window refractance, vacuum belt drying, or other low-temperature drying.

[13] In another aspect, phytonutrients can, in further aspects, be present in the amount of from .1 mcg to 20,000 mg/day or from 1000 mcg to 20,000 mg/day from each source. Phytonutrients from green pigment group components include, but not limited to, chlorophyll, lutein, glutathione, alpha lipoic acid, D-glucaric acid, saponins, patuletin, spinacetin, spinatoside, rutin, or lignans. Phytonutrients from red pigment group components

include, but not limited to, lycopene, zeta carotene, kaempferol, quercetin, p-coumaric acid, delphinidin, malvidin, cyanidin, chlorogenic acid, phytoene, phytofluene, epigallocatechin gallate, ellagic acid, benzoic acid, lignans, myricetin, ferulic acid. Phytonutrients from yellow/orange pigment group components include, but not limited to, hesperetin, limonin, nomilin, d-limonene, beta-sitosterol, mangiferine, syringic acid, beta cryptoxanthin, ferulic acid, chlorogenic acid, or vanillic acid. Phytonutrients from purple/blue pigment group components include, but not limited to, cyaniding, delphinidin, malvidin, peonidin, petunidin, catechins, geraniol, resveratrol, tartaric acid, quercetin, tannins, saponins, caffeic acid, chloregenic acid, sorbitol, or malic acid.

[14] In another aspect, the at least one whole or partial food fruit component and at least one whole or partial food vegetable component each have green pigmentation. In such cases, the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component are selected from the group consisting of green pea, grapes, honeydew melon, pear, artichoke, green apple, green beans, cabbage, okra, watercress, peppers, broccoli, spinach, kale, kiwi, asparagus, avocado, collards, lime, romaine, brussels sprouts, algae, spirulina, fennel, cucumber, zucchini, and/or Swiss chard.

[15] In a further aspect, the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component each have red pigmentation. In such cases, the at least one whole or partial food fruit component and at least one whole or partial food vegetable component are selected from the group consisting of beets, apples, strawberries, red pear, raspberries, cranberries, blood oranges, red grapes, pomegranate, cherry, peppers, rhubarb, prickly pear, watermelon, cabbage, radishes, radicchio, red onion, red potato, grapefruit, crampberry, and/or tomato.

[16] In a further aspect, the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component each have yellow/orange pigmentation. In such cases, the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component are selected from the group consisting of carrot, butternut squash, sweet potato, mango, pineapple, pumpkin, apricot, peach, banana, beets, figs, watermelon, potato, persimmons, yellow bell peppers, lemon, cantaloupe, papaya, star fruit, grapefruit, tangerine, and/or orange.

[17] In a further aspect, the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component each have blue/purple pigmentation. In such cases, the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component are selected from the group consisting of purple beets, purple cabbage, concord grape, acai, blackberry, blueberry, elderberries, figs, kohlrabi, figs, peppers, potato, huckleberry, chokecherry, mulberry, plum, purple carrot, corn, cauliflower, poi, black currant, eggplant, black raspberry, purple carrot, acerola, cauliflower, potato, and/or passion fruit.

[18] In a further aspect, the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component each have white pigmentation. In such cases, the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component are selected from the group consisting of crimini mushroom, lychee, rambutan, Fijian longan, dragon fruit, white peach, white pear, white nectarine, parsnip, shallots, jicama, Jerusalem artichoke, onion, leeks, cauliflower, and/or coconut.

[19] In a further aspect, the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component each have black pigmentation. In such cases, the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component are selected from the group consisting of black olives, black cherries, black plums, black currants, and/or black figs.

[20] In another aspect, the composition can have a decreased likelihood of clumping or hardening in a sealed package than a single-component composition. The compositions can be used for animal or human consumption in a smoothie, fruit drink, shake, food coloring, flavoring, baby food, sports supplemental product, baked good, or other food product. In another aspect, the composition can be used in a product for topical use that is applied to body surfaces (*e.g.*, skin or mucous membrane) or hair, such as, but not limited to, a lotion, cream, soap, gel, foam, ear drops, eye drops, inhalers (*e.g.*, dry powder inhalers, metered-dose inhalers, nebulizers), mist and ointment. In another aspect, the composition can be used in a product for sun protection, including but not limited to sunscreen lotion or spray. In still further aspect, the compositions can further comprise additional ingredients such as herbs,

spices, vitamins, minerals, food additives for preservation of and/or improved taste, freshness, or mouthfeel, or a combination thereof.

[21] In a further aspect, wherein the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component each have a 1-99 weight percent of the composition.

[22] In a further aspect, the composition is formulated as a powder, flakes, tablet, or capsule.

[23] In another aspect, use of the composition as a nutritional source or supplement for humans.

[24] In another aspect, a method for preparing a fruit and vegetable-based food product formulation for animal or human consumption comprising: blending the composition and a liquid (*e.g.*, water) in a high-speed blender to form a slurry.

BEST MODE(S) FOR CARRYING OUT THE INVENTION

[25] The illustrative embodiments herein described in the detailed description, drawings, and claims are not meant to be limiting. Other embodiments may be utilized, and other changes may be made, without departing from the spirit or scope of the subject matter presented here. It will be readily understood that the aspects of the present disclosure, as generally described herein, can be arranged, substituted, combined, and designed in a wide variety of different configurations, all of which are explicitly contemplated and made part of this disclosure.

[26] The present invention is based upon the discovery of dried fruit and/or vegetable compositions that can provide a stable source of fruits, vegetables, and necessary phytonutrients with a long shelf-life, decreased clumping and hardening, and health benefits not decreased from the fresh forms of the fruits and vegetables. Also, such compositions are formulated in a manner that promotes convenience of use and improved cellular absorption. Further, no artificial flavors, preservatives, colors, binders, or fillers are added into the compositions of the present invention since the preparation process discussed herein (*e.g.*, drying/dehydration techniques) preserves a high amount of phytonutrients, pigments, and

other health-enriching characteristics of each fruit or vegetable used in the compositions discussed herein.

Fruits and Vegetables

[27] Fruits and vegetables must be harvested at the time of ripening, crispness, freshness, taste, appearance, condition, and highest nutritive value. Because of the perishable nature of fruits and vegetables, harvesting and handling speed is of utmost importance. Any techniques known to those in the art may be used to extend postharvest shelf life, including removal from direct sunlight and reducing the respiration by hydro or rapid cooling; slow respiration by maintaining optimal shipping and storing environment; or maintaining optimal relative humidity. Special skills are required for proper harvesting, handling, grading to ensure optimum quality. Fruits and vegetables are cleaned, then prepared, by removing stems, leaves and other inedible parts. Additional measures are taken to ensure high quality, premium fruit and vegetable.

[28] The fruits and vegetables used in the compositions described herein are grouped by phytonutrients or pigmentation. Generally, fruits and vegetables having a red pigmentation can be grouped together; fruits and vegetables having a yellow/orange pigmentation can be grouped together; fruits and vegetables having a green pigmentation can be grouped together; fruits and vegetables having a purple/blue pigmentation can be grouped together; fruits and vegetables having a white pigmentation can be grouped together; and fruits and vegetables having a black pigmentation can be grouped together. The fruits and vegetables can be grouped regardless of whether they share or have the same pigmentation. For example, fruits and vegetables can be grouped by one or more phytonutrients, regardless of pigmentation.

[29] Each whole or partial fruit or vegetable component can be provided in any concentration. For example, each component can be about 1% by weight, about 2% by weight, about 4% by weight, about 5% by weight, about 10% by weight, about 15% by weight, about 18% by weight, about 20% by weight, about 22% by weight, about 23% by weight, about 24% by weight, about 25% by weight, about 30% by weight, about 35% by weight, about 40% by weight, about 45% by weight, about 50% by weight, about 55% by weight, about 60% by weight, about 70% by weight, about 80% by weight, about 90% by weight, or about 99% by weight. Also, each component can have a range (by weight) of 1%-2%; 2%-4%; 1%-5%; 2%-4%; 2%-5%; 4%-6%; 5%-7%; 6%-8%; 7%-10%; 8%-11%; 8%-

14%; 9%-14%; 12%-14%; 15%-19%; 15%-22%; 15%-24%; 19%-21%; 19%-24%; 21%-24%; 24%-33%; 25%-30%; 1%-15%; 1%-18%; 1%-20%; 1%-22%; 1%-23%; 1%-24%; 1%-25%; 1%-30%; or 30%-99%.

[30] Pigmentation compositions can include a minimum of 12 fruits and vegetables components which provide phytonutrients in certain ratios and levels present in a portion ranges of approximately 0.1 mcg to 20,000 mg/day or 1000 mcg to 20,000 mg/day from each red pigment source including but not limited to beets, apples, strawberries, red pear, raspberries, cranberries, pomegranate, acerola cherry, red peppers, rhubarb, prickly pear, and tomato. Purple/Blue pigments include but not limited to fruits and/or vegetables which provide phytonutrients in certain ratios and levels present in a portion ranges of approximately 0.1 mcg to 20,000 mg/day from purple beets, purple cabbage, concord grape, acai, blackberry, blueberry, plum, purple carrot, black currant, eggplant, black raspberry, and passion fruit. Yellow/orange pigment sources include but not limited to fruits and/or vegetables which provide phytonutrients in certain ratios and levels present in a portion ranges of approximately 0.1 mcg to 20,000 mg/day from carrot, butternut squash, sweet potato, mango, pineapple, pumpkin, apricot, peach, banana, yellow bell peppers, lemon and orange. Green pigment sources include but not limited to fruits and/or vegetables, which provide phytonutrients in certain ratios and levels present in a portion ranges of approximately 0.1 mcg to 20,000 mg/day from green pea, apple pulp, broccoli, spinach, kale, kiwi, asparagus, collards, lime, romaine, brussel sprouts, and Swiss chard.

[31] The compositions described herein include ratios and levels of enzymes, organic substances, metabolites, phytonutrient families, terpenes, carotenoids, polyphenolics, anthocyanins, glycosides, polysaccharides, flavonoids, from various whole food sources including but not limited to: rasaceae, vitaceae, rutaceae, lythraceae, schisandraceae, cucurbitaceae, sapindaceae, rhamnaceae, malvaceae, elaeagnaceae, organized by fruits and vegetables by pigments or color from a minimum of 2, a minimum of 5, a minimum of 10, or a minimum of 12 sources or more of red, yellow/orange, purple/blue, green, white and black colored fruits and vegetables. Such substances in these compositions have been shown to aid in the prevention and/or treatment of tumor growth, cancer formation, cancer diffusion, abnormal angiogenesis, neuroprotective disorder, diabetes, inflammation, atherosclerosis, viral infection, toxicity, glycemia, oxidation, leishmanial, molluscicidal, choleric, and

spasmodic, immune and autoimmune disease, blood coagulation, osteoarthritis, rheumatoid arthritis, cataracts, liver malfunction, kidney disease, blood sugar disorders, fatigue, wound healing, and metabolic syndrome.

Drying/Dehydration Techniques

[32] The compositions described herein can be dried using any low-temperature drying mechanism known in the art. For example, the compositions can be dried using rapid zone drying, window refractance, vacuum belt drying, or other low temperature drying. For example, the method of U.S. Patent No. 4,631,837 can be used, which involves floating an infrared-transparent on the surface of a body of heated water and placing the material to be dried, such as the pulp and juice mix, on top of the film to absorb heat from the water and thereby cause drying/dehydration of the material. The apparatus for carrying out this drying method includes a reservoir of water, a film floated on the water, and a heater for maintaining the temperature of the water at a predetermined level. In a preferred aspect, the reservoir is in the form of an elongated trough and the film comprises an endless strip of polyester material, such as Mylar, to form a conveyor belt that floats on the surface of the water in the trough and carries the material to be dried on it.

[33] In another example, the method of U.S. Patent No. 6,539,645 can be used for drying/dehydrating of the compositions. The method involves placing the product on a first side of a support surface, and directing dry infrared light toward the second side of the surface to remove moisture from the product. A sensor can be included to measure at least one characteristic of the product, such as the temperature or moisture content thereof. The temperature of the light source can be regulated as a function of the measured characteristic. The support surface can also be made so as to be movable relative to the light source. In an alternative method, a plurality of control zones is defined and through which the product is successively passed. Each of the control zones has at least one associated light source and an associated sensor so as to regulate the temperature of the light sources associated with each control zone independently of those associated with another zone.

[34] The compositions described herein can also include any other ingredients deemed desirable or known in the art, such as, but not limited to, the following: vitamins, minerals, antioxidants, spices, herbs, or other food additives for the preservation of taste, freshness, consistency or mouthfeel. Such additives are well known in the art.

[35] Exemplary food fruit and vegetable components for red pigmented compositions, orange/yellow pigmented compositions, green pigmented compositions, and purple/blue pigmented compositions are described as follows in **TABLE 1**:

TABLE 1

Red-Pigmented Sources	Orange/Yellow Pigmented Sources	Green Pigmented Sources	Purple/Blue Pigmented Sources
Apple	Carrot	Green Peas	Beets
Beets	Butternut Squash	Apple	Purple Cabbage
Red Cabbage	Sweet Potato	Broccoli	Concord Grape
Strawberry	Mango	Green Cabbage	Purple Carrot
Red Pear	Banana	Spinach	Acai
Raspberry	Pineapple	Kale	Blackberry
Cranberry	Pumpkin	Kiwi	Blueberry
Pomegranate	Apricot	Asparagus	Plum
Acerola Cherry	Peach	Collards	Acerola
Red Pepper	Yellow Bell Pepper	Acerola	Black Currant
Rhubarb	Lemon	Lime	Eggplant
Prickly Pear	Orange	Brussels Sprouts	Black Raspberry
Tomato	Beet	Swiss Chard	Passion Fruit
Red grapes	Fig	Romaine	Huckleberry
Cabbage	Watermelon	Avocado	Mulberry
Radishes	Potato	Fennel	Elderberries
Radicchio	Persimmon	Cucumber	Figs
Red onion	Star Fruit	Watercress	Kohlrabi
Crampberry	Tangerine	Okra	Poi
Red Grapefruit	Grapefruit	Pear	Cauliflower
Watermelon		Sprulina	Potato
Blood Orange		Melon (e.g., Honeydew Melon)	Purple Carrot

[36] The present invention will now be described in greater detail by reference to the following non-limiting examples.

EXAMPLES

[37] Example 1 – Formulation of Dried Fruit and Vegetable Compositions

[38] To formulate the dried fruit and vegetable compositions, fruits and vegetables are harvested at the time of ripening, crispness, freshness, taste, appearance, condition, and highest nutritive value. Because of the perishable nature of fruits and vegetables harvesting and handling speed is of utmost importance. Several techniques that are used to extend postharvest shelf life are known to those of skill in the art, and one or more of the following

is employed: removal from direct sunlight and reducing the respiration by hydro or rapid cooling; slow respiration by maintaining optimal shipping and storing environment; and/or maintaining optimal relative humidity. Fruits and vegetables are cleaned, then prepared, by removing stems, leaves and other inedible parts.

[39] Each individual fruit or vegetable is juiced or pureed, kept cool, and then mixed together with additional fruits and vegetables of the same pigment, according to the combinations found in **TABLE 2** (green pigmented compositions), **TABLE 3** (orange/yellow pigmented compositions), **TABLE 4** (purple/blue pigmented compositions), and **TABLE 5** (purple/blue pigmented compositions). Once the fruits and vegetables of the same or similar pigment have been mixed together they undergo fresh drying. There are only a few low temperature approved drying methods that can be used, such as rapid zone drying, window refractance, vacuum belt drying, or other low temperature drying. Once dried, each of the sources is tested.

TABLE 2 – GREEN PIGMENTED COMPOSITIONS

<u>Component</u>	<u>Latin Binomial</u>	<u>Part Used</u>	<u>Weight %</u>
Peas	<i>Pisum sativum</i>	Whole Vegetable	1-24%
Apple	<i>Malus domestica</i>	Whole Fruit	1-24%
Apple Juice	<i>Malus domestica</i>	Fruit Juice	1-24%
Kiwi	<i>Actinidia deliciosa</i>	Whole fruit	1-24%
Broccoli	<i>Brassica oleracea</i>	Whole Vegetable	1-22%
Spinach	<i>Spinacia oleracea</i>	Leaf and steam juice	1-22%
Kale	<i>Brassica oleracea</i>	Whole Leaf and stem	1-22%
Green Cabbage	<i>Brassica oleracea</i>	Whole Head	1-20%
Acerola	<i>Malpighia emarginata</i>	Fruit Juice	1-20%
Asparagus	<i>Asparagus officinalis</i>	Whole Stalk	1-20%
Brussel Sprouts	<i>Brassica oleracea</i>	Whole vegetable	1-20%
Lime	<i>Citrus xlatitifolia</i>	Fruit Juice	1-18%
Collards	<i>Brassica oleracea</i>	Whole leaf and steam	1-18%
Romaine Lettuce	<i>Lactuca sativa</i>	Whole leaf and steam	1-15%
Swiss Chard	<i>Beta vulgaris ssp. cicla</i>	Whole Vegetable	1-15%

TABLE 3 – ORANGE/YELLOW PIGMENTED COMPOSITIONS

<u>Component</u>	<u>Latin Binomial</u>	<u>Part Used</u>	<u>Weight %</u>
Carrot	<i>Daucus carota</i>	Whole Root/juice	1-24%
Sweet Potato	<i>Ipomoea batatas</i>	Whole vegetable	1-24%
Pumpkin	<i>Cucurbita moschata</i>	Whole vegetable	1-24%
Butternut Squash	<i>Cucurbita moschata</i>	Whole vegetable	1-23%
Banana	<i>Musa acuminata</i>	Whole fruit	1-23%
Mango	<i>Mangifera indica</i>	Whole Fruit	1-22%
Pineapple	<i>Ananas comosus</i>	Whole Fruit/ juice	1-21%
Acerola	<i>Malpighia emarginata</i>	Whole Fruit/Juice	1-21%
Apricot	<i>Prunus armeniaca</i>	Whole fruit	1-20%
Peach	<i>Prunus persica</i>	Whole fruit	1-20%
Yellow Bell Pepper	<i>Capsicum annuum</i>	Whole fruit	1-20%
Lemon	<i>Citrus limon</i>	Whole Fruit/juice	1-18%
Orange	<i>Citrus × sinensis</i>	Whole Fruit/juice	1-18%

TABLE 4 – PURPLE/BLUE PIGMENTED COMPOSITIONS

<u>Component</u>	<u>Latin Binomial</u>	<u>Part Used</u>	<u>Weight %</u>
Beet	<i>Beta vulgaris</i>	Whole Root/ juice	1-24%
Purple Carrot	<i>Daucus carota</i>	Whole Root/ juice	1-24%
Concord Grape	<i>Vitis labrusca</i>	Whole Fruit/ juice	1-24%
Acai	<i>Euterpe oleracea</i>	Whole fruit	1-24%
Blueberry	<i>Vaccinium corymbosum</i>	Whole fruit	1-24%
Blackberry	<i>Rubus fruticosus</i>	Whole fruit	1-22%
Purple cabbage	<i>Brassica oleracea</i>	Whole leaf and stem	1-22%
Acerola	<i>Malpighia emarginata</i>	Whole Fruit/ juice	1-20%
Eggplant	<i>Solanum melongena</i>	Whole Vegetable	1-20%
Plum	<i>Prunus domestica</i>	Whole fruit	1-20%
Black Raspberry	<i>Rubus leucodermis</i>	Whole fruit	1-20%
Black Currant	<i>Ribes nigrum</i>	Whole Fruit/ juice	1-18%
Passion Fruit	<i>Passiflora edulis</i>	Whole fruit	1-18%

TABLE 5 – RED PIGMENTED COMPOSITIONS

<u>Component</u>	<u>Latin Binomial</u>	<u>Part Used</u>	<u>Weight %</u>
Apple	Malus domestica	Whole Fruit	1-24%
Beet	Beta vulgaris	Whole Root juice	1-24%
Pear	Pyrus communis	Whole fruit	1-24%
Strawberry	Fragaria x ananassa	Whole fruit	1-24%
Raspberry	Rubus idaeus	Whole fruit	1-20%
Cranberry	Vaccinium Macrocarpon	Whole fruit	1-20%
Acerola	Malpighia emarginata	Whole Fruit/ juice	1-20%
Pomegranate	Punica granatum	Whole Fruit/ juice	1-20%
Red Peppers	Capsicum annuum	Whole fruit	1-20%
Rhubarb	Rheum rhabarbarum	Whole fruit	1-20%
Prickly Pear	Opuntia sp	Whole fruit	1-20%
Tomato	Solanum lycopersicum	Whole vegetable	1-20%
Cherry	Prunus cerasus	Fruit juice	1-18%

[40] The components and/or weight percentages used in the compositions, such those shown above, can vary based on seasonal availability, harvest timing, and supply of particular vegetable, fruit or other agriculture-based sources. For example, if a particular component is unavailable due seasonal frost, another component from the same or another pigment source can be used as a replacement at the same or different weight percentage.

[41] The foregoing description of illustrative examples has been presented for purposes of illustration and of description. It is not intended to be exhaustive or limiting with respect to the precise form disclosed, and modifications and variations are possible in light of the above teachings or may be acquired from practice of the disclosed aspects of the present invention. It is intended that the scope of the present invention be defined by the claims appended hereto and their equivalents.

CLAIMS

What is claimed is:

1. A composition comprising:
at least one whole or partial food fruit component and/or at least one whole or partial food vegetable component.
2. The composition of claim 1, wherein both the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component have the same or similar pigment group selected from the group consisting of red, yellow/orange, purple/blue, green, black, and white.
3. The composition of claim 1 or 2, wherein the at least one whole or partial fruit component and the at least one whole or partial food vegetable component are juiced or pureed, combined and then dehydrated.
4. The composition of 3, wherein the at least one whole or partial fruit component and the at least one whole or partial food vegetable component are dehydrated by a low temperature drying method.
5. The composition of 4, wherein the low temperature drying method is selected from the group consisting of rapid zone drying, and/or window refractance, and/or vacuum belt drying and/or other low temperature drying methods.
6. The composition of any of claims 1-5, wherein composition comprises at least 10 separate whole or partial fruit or vegetable components.
7. The composition of any of claims 1-5, wherein the composition comprises at least 12 separate whole or partial fruit or vegetable components.

8. The composition of any of claims 1-7, wherein phytonutrients/pigments are present from the sourced fruit or vegetable of the same pigment is included in the amount of from .1 mcg to 20,000 mg/day from each source.

9. The composition of any of claims 1-8, wherein the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component each have green pigmentation.

10. The composition of claim 9, wherein the at least one whole or partial food fruit component and the at least one whole food or partial vegetable component are selected from the group consisting of green pea, apple, kiwi, broccoli, spinach, kale, green cabbage, acerola, asparagus, Brussels sprouts, lime, collards, romaine lettuce, swiss chard, kiwi, avocado, fennel, cucumber, watercrest, okra, pear, and a combination thereof.

11. The composition of any of claims 1-8, wherein the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component each have red pigmentation.

12. The composition of claim 11, wherein the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component are selected from the group consisting of beets, apples, red cabbage, strawberries, red pear, raspberries, cranberries, pomegranate, acerola cherry, red peppers, rhubarb, prickly pear, tomato, red grapes, radish, radicchio, red onion, crampberry, and a combination thereof.

13. The composition of any of claims 1-8, wherein the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component each have yellow/orange pigmentation.

14. The composition of claim 13, wherein the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component are selected from the group consisting of carrot, sweet potato, pumpkin, butternut squash, banana, mango, pineapple, acerola, apricot, peach, yellow bell peppers, lemon, orange, pumpkin, beets, figs, watermelon, potato, persimmons, star fruit, tangerine, grapefruit, and a combination thereof.

15. The composition of any of claims 1-8 wherein the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component each have purple/blue pigmentation.

16. The composition of claim 15, wherein the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component are selected from the group consisting of purple beets, purple cabbage, concord grape, acai, blackberry, blueberry, plum, purple carrot, black currant, eggplant, black raspberry, passion fruit, acerola, huckleberry, mulberry, elderberry, fig, kolrabi, poi, cauliflower, potato, and a combination thereof.

17. The composition of any of claims 1-8, wherein the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component each have white pigmentation.

18. The composition of claim 17, wherein the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component are selected from the group consisting of crimini mushroom, onion, leeks, cauliflower, coconut, and a combination thereof.

19. The composition of any of claims 1-18, wherein the composition is packaged in pre-sterilized containers or packages.

20. The composition of any of claims 1-18, wherein the composition is used for animal or human consumption in a smoothie, fruit drink, shake, food coloring, flavoring, baby food, sports supplemental product, baked good, or other food product.

21. The composition of any of claims 1-18, wherein the composition is comprised in a product for cosmetic or topical use.

22. The composition of claim 21, wherein the product is a lotion, shampoo, conditioner, makeup, cream, soap, gel, foam, ear drops, eye drops, inhaler, mist, or ointment.

23. The composition of any of claims 1-22, further comprising additional ingredients selected from the group consisting of spices, vitamins, minerals, food additives for preservation of taste, freshness, or mouthfeel, or combination thereof.

24. The composition of any of the claims 1-23, wherein the at least one whole or partial food fruit component and the at least one whole or partial food vegetable component each have a 1-99 weight percent of the composition.

25. The composition of any of the claims 1-24, wherein the composition is formulated as a powder, flakes, tablet, or capsule.

26. Use of a composition of any one of claims 1-25 as a nutritional source or supplement for humans or animal.

27. A method for preparing a fruit and vegetable-based food product formulation for animal or human consumption comprising: blending the composition of any of claims 1-25 and a liquid in a blender to form a slurry.

28. A composition of Table 2, 3, 4 or 5, wherein the weight ratios for all of the components in the composition adds to approximately 100%.

29. The composition of any one of claims 1-25 and 28, wherein no artificial flavors, preservatives, colors, binders, or fillers are added to said composition.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US15/39810

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A23L 2/02, 2/04, 2/08 (2015.01)

CPC - A23L 1/212, 1/0035, 1/3002

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8) - A23L 2/02, 2/04, 2/08 (2015.01)

CPC - A23L 1/212, 1/0035, 1/3002, 1/2128, 1/2121

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

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

PatSeer (US, EP, WO, DE, GB, FR, KR, ES, CA); Google Scholar; ProQuest; PubMed. Keywords: fruit, vegetable, juice, puree, blend, dehydrated, pigment, color, peas, apple, kiwi, broccoli, spinach, kale, green cabbage, asparagus, brussels sprouts, lime, collards, romaine lettuce, swiss chard

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ---	(CAREY, S et al.) "Green Juice Cleanse Recipes"; March 5, 2013; [retrieved 09 September 2015]. Retrieved from the Internet: <URL: http://www.rawjuicecleanserecipes.com/green-juice-cleanse-recipes/ >; page 3, recipe 2; page 4, recipe 4; page 8, recipe 10; page 9, recipe 12; page 10, recipe 14; page 11, recipe 15; pages 11-12, recipe 16; page 12, recipe 17; page 16, recipe 23	1-2 ----- 3/1-2, 4/3/1-2, 5/4/3/1-2,
Y	KR 101375954 B1 (KAO CORP) 18 March 2014; see English translation; paragraphs [14], [27]-[28]	3/1-2, 4/3/1-2, 5/4/3/1-2
Y	US 2,919,199 A (TOULMIN, HA) 29 December 1959; column 1, lines 21-34; column 2, lines 1-22	3/1-2, 4/3/1-2, 5/4/3/1-2
A	(MOMOFUKU SSAM BAR.) "Spring Pea"; 2011; [retrieved 09 September 2015]. Retrieved from the Internet: <URL: http://nymag.com/listings/recipe/spring-pea/ >; page 1, ingredients and instructions	28
A	US 6,620,440 B1 (HSIA, HS et al.) 16 September 2003; column 9, lines 44-50	28
A	WO 2010/003787 A1 (ECKES-GRANINI GROUP GMBH) 14 January 2010; page 9, lines 4-5; page 16, lines 29-30; page 17, line 1	28
A	(CAREY, S et al.) "Celery Juice Cleanse Recipes" May 2, 2013; [retrieved 09 September 2015]. Retrieved from the Internet: <URL: http://www.rawjuicecleanserecipes.com/celery-juice-cleanse-recipes/ >; page 5, recipe 8	1-2, 3/1-2, 4/3/1-2, 5/4/3/1-2, 28
A	WO 2013/106754 A1 (SAVARESE, M et al.) 18 July 2013; entire document	1-2, 3/1-2, 4/3/1-2, 5/4/3/1-2, 28

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:

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

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

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

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

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

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

09 September 2015 (09.09.2015)

Date of mailing of the international search report

16 OCT 2015

Name and mailing address of the ISA/

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-8300

Authorized officer

Shane Thomas

PCT Helpdesk: 571-272-4300

PCT OSP: 571-272-7774

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US15/39810

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☒ Claims Nos.: 6-27 and 29
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.