

TriVita™

Sonora Desert Monograph

The Sonora Desert: People, Plants and Pharmacopeia

The Sonora Desert is the most extreme desert in the world. It covers an area of over 100,000 square miles in the Southwestern region of North America. This region is home to the Pima people and their relatives. Altogether, 17 different tribes thrive in this region. The people that prosper in this stressful environment have lessons for the rest of the world. Their legacy, their message is that we can survive and even thrive in our stressful, toxic world by eating the Nopal Pear Superfruit of the Sonora Desert.

The Sonora Desert contains the oldest living plant species on earth. You can literally walk up and touch plants that are thousands of years old! The flora here is so robust that it is used to reclaim desert areas around the world. For example, the Sonora *Opuntia* has been used to reclaim portions of the Sahara Desert. The *Opuntia ficus indica* or Nopal Pear cactus is used as both food and medicine by indigenous peoples.

The Nopal Pear is used as a main dietary fruit by the Sonora peoples. It has been used traditionally to promote vitality, reduce inflammation and protect against toxins and poisons. Recent research confirms that this fruit contains the richest concentration of Betalains of any plant in the world. Betalains create health by balancing the environment inside the cell with the environment outside the cell.

Betalains are a class of special nutrients designed to balance inflammation. Betalains rescue the cell by quenching the fire of inflammation created by free radicals. Then, toxins are drained away from the cell and the protein matrix of Betalains permeates and reinforces the cell, returning it to health. Healthy cells make healthy people!

The human body is designed to heal itself. A powerful force called homeostasis mobilizes your immune system, hormones, nerves and other important systems to ignite the healing process. Homeostasis uses inflammation to remodel your cells following injury, illness or even the extreme challenges of emotional stress. Once the healing process is complete, homeostasis puts the fire out and returns your body to a state of dynamic and vital balance – free from the effects of runaway inflammation.

Homeostasis orchestrates the cells in your body to maintain balance under even severe conditions. During its life cycle a cell may be damaged by exposure to toxins, direct trauma, nutrient deficiencies and stress. Each of these circumstances causes inflammation and free radical production. Intense nutrition is needed to battle these causes of premature cell death.

Betalains extinguish runaway inflammation by turning off enzymes that may be turned on by trauma, toxins, deficiency or stress. Betalains protect against toxins and poisons

by building an impenetrable bulwark in the wall of blood cells, brain cells and all other cells in your body against the oxidation of premature aging.

There are times when your body cannot heal itself. If Inflammation overwhelms a cell it may be damaged beyond repair. Damaged, dead cells must be removed or they will become the focus of infection and illness. Betalains assist a special cell called a Macrophage (literally “big eater”) to engulf the dead cell and eliminate it from your body.

Premature aging occurs when more cells die than you can replace. Daily servings of Nopalea will provide you with the Betalains that put-out the fire of runaway inflammation and rescue cells under attack by free radicals. Further, Betalains act to clean up the dead cells and help to prevent them from becoming a target for disease.

Betalains help you thrive as they help control inflammation and support the miracle of homeostasis.

The Sonora Desert is a Wellspring of Wellness. Now, at the most critical moment in our health care crisis, the gifts of the Sonora are serving as guides for us. Let the gentle, profound wisdom of the Sonora guide you to increased vitality and sustained energy. Let the strength of this extreme environment protect you from toxins and inflammation. Reverse the process of premature aging by embracing the timeless wisdom of the Sonora Desert.

Nopalea Ingredient Summary:

Sonora Nopal Pear Fruit Concentrate

The *Opuntia ficus indica*, or Sonora Nopal Pear is rich in Betalains. Recent clinical trials support this ingredients ability to:

- Reduce Inflammation
- Detoxify cytotoxic (cell-damaging) poisons
- Protect against premature aging
- Promote optimum cellular health

Promotes Optimum Cellular Health

The environment surrounding most cells in the human body is comprised mostly of water. Inflammation in the cells causes the water to heat up – think of boiling water or even super-heated geysers. Heat causes the wall of the cell to wither, melt and break down very rapidly. Nopalea drives down inflammation and turns the fluid environment of the cell into cool, refreshing water that supports a firm, robust cell membrane. A cool environment for the cell slows down the aging process – think of the imperceptibly slow progress of a glacier!

During the inflammatory process a chemical is released known as myeloperoxidase (MPE). This is the most powerful oxidant produced by the human neutrophil during acute inflammation, especially from infection or cancer. **(1)** Soon, Betalains found in Nopalea douse the wildfire of inflammation caused by MPE and protect the healthy cells. **(2)** Meanwhile, Betalains drain toxic waste water surrounding the cells and create a cooling environment conducive to cell health. **(3)**

Reduces Inflammation

The most common causes of death from disease in North America are related to atherosclerosis – hardening of the arteries. Healthy arteries become diseased from inflammation. Often, LDL (“bad” cholesterol) oxidizes because of stress or toxins or a diet deficient in antioxidants. The inflamed LDL ricochets off the delicate lining of the blood vessel leaving microscopic injuries like millions of tiny paper cuts in the blood vessels. The blood vessels themselves inflame in response to this injury and become sticky. Sticky arteries and sticky cholesterol is a recipe for disaster. Soon, adhesion molecules called ICAM-1 cause the sticky compound to harden.

Betalains from Nopalea reduce inflammation through antioxidant protection of the blood vessel lining and by reducing inflammation in the “bad” LDL cholesterol. **(4)** What is more, Betalains prevent ICAM-1 from hardening the cholesterol compound. **(5)** By doing this, Betalains from Nopalea provide protection for the delicate lining of the arteries and reduce the risk for heart attacks, stroke and other vascular diseases.

Detoxify Poisons

The Sonora desert is a pristine environment. Conversely, the flora and fauna of the Sonora desert are among the most poisonous in the world! How is the delicate balanced maintained so that environmental toxins do not corrupt these spotless surroundings? Once again, the answer is found in the plants of the Sonora and the primary anti-toxin, Betalains.

A number of experiments have been designed to test the anti-toxin ability of Betalains. Now, it must be recognized first that testing poisons on health humans is unethical. Yet, people routinely poison themselves and therefore provide ample opportunity to test the anti-toxic benefits of the plants of the Sonora Desert.

One of the most popular series of studies on human toxicity involves one of the most common poisons: alcohol. Many people routinely “intoxicate” themselves with this substance. This provides us with an abundance of test subjects – especially on college campuses across North America and probably around the world! A study completed in 2004 demonstrated that Nopal not only protected against signs of alcohol toxicity, it also reduced inflammation as measured by CRP. (6)

Other tests on red blood cells of humans and animals have challenged toxins associated with fatal poisons like carbon tetrachloride, toxins created by viruses like Epstein-Barr and even toxins created by cancers such as Chronic Myeloid Leukemia. (7,8,9)

Protects Against Premature Aging

A cell has a “pre-programmed” lifespan. If the cell ages at the appropriate rate we call that healthy aging. If the cell ages too quickly we call that premature aging. Many aspects of the environment of the cell contribute to how quickly – or how slowly – the cell ages. Among the influences already mentioned are fluid balance, inflammation and toxicity. When fluid is balanced and inflammation and toxicity are low, the cell has the opportunity to age in a healthy way.

Most cells in the human body are surrounded by fluid. The pressure inside the cell should be twice as high as the pressure outside the cell in healthy cells. In sick cells that age too quickly the gradient of pressure is the same on the inside of the cell as it is on the outside of the cell. This cell will die as it is unable to get nutrients to the inside and push waste to the outside.

Much of the health of the cell depends on the health of the membrane called the cell wall. Think of the membrane of a balloon: the thicker and more robust the balloon membrane is, the more pressure it can hold and more resistant to “popping” it becomes. The cell wall is much the same except, unlike the balloon membrane the cell wall is living tissue. It requires building blocks made of fats and proteins and pressure pumps fueled by minerals.

Betalains act like anchors to give structure to the proteins and fats that comprise the cell walls. This keeps the cell wall healthy and prevents it from breaking down prematurely. It also makes the cell wall robust and prevents it from “popping” too easily. **(10)** Further, Betalains create the perfect mineral balance inside the cell (mostly potassium and magnesium) and outside the cell (mostly sodium and calcium). The tension created by these minerals produces electricity that fuels the pump and keeps the pressure inside the cell higher than the pressure outside the cell. **(11)** The combination of these effects results in slowing the aging process and allowing the cell to live out its full lifespan in a balanced, healthy way.

Nopalea and Diabetes

Nopalea is derived from the fruit of the Nopal cactus. Nopal fruit and leaves have been used to control rapid changes in blood glucose levels in both animals and humans. **(12, 13)** However, Nopalea is a fruit juice. Its metabolism must be calculated as any fruit juice: the current harvest has 14 calories and about 3 ½ grams of carbohydrate per ounce. It should be treated as any other food in diabetic calculations.

On the positive side, type 2 diabetes is an inflammatory condition. Nopal cactus fruit reduces inflammation. **(14)** So, Nopalea may provide benefits beyond blood sugar stability; it may actually reduce some of the inflammation that causes long-term health concerns for people with type 2 diabetes.

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Department of Pharmaceutical, Toxicological and Biological Chemistry,
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The protective effects of the juice of *Opuntia ficus indica* fruit (prickly pear) against carbon tetrachloride (CCl₄)-induced hepatotoxicity were examined in

rats. The animals were treated orally with the juice (3 mL/rat) 2 h after administration of the hepatotoxic agent. Preventive effects were studied by giving the juice (3 mL/rat) for 9 consecutive days. On day 9 the rats received the hepatotoxic agent. Morphological and biochemical evaluations were carried out 24, 48 and 72 h after induction of the hepatic damage. Data show that *O. ficus indica* fruit juice administration exerts protective and curative effects against the CCl₄-induced degenerative process in rat liver. Histology evaluation revealed a normal hepatic parenchyma at 48 h; the injury was fully restored after 72 h. Moreover, a significant reduction in CCl₄-induced increase of GOT and GPT plasma levels is evident; these data are in agreement with the functional improvement of hepatocytes. *O. ficus indica* fruit juice contains many phenol compounds, ascorbic acid, betalains, betacyanins, and a flavonoid fraction, which consists mainly of rutin and isorhamnetin derivatives. Hepatoprotection may be related to the flavonoid fraction of the juice, but other compounds, such as vitamin C and betalains could, synergistically, counteract many degenerative processes by means of their antioxidant activity. Copyright 2005 John Wiley & Sons, Ltd.

J Agric Food Chem. 2002 Nov 6;50(23):6895-901.

Antioxidant activities of sicilian prickly pear (*Opuntia ficus indica*) fruit extracts and reducing properties of its betalains: betanin and indicaxanthin.

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Sicilian cultivars of prickly pear (*Opuntia ficus indica*) produce yellow, red, and white fruits, due to the combination of two betalain pigments, the purple-red betanin and the yellow-orange indicaxanthin. The betalain distribution in the three cultivars and the antioxidant activities of methanolic extracts from edible pulp were investigated. In addition, the reducing capacity of purified betanin and indicaxanthin was measured. According to a spectrophotometric analysis, the yellow cultivar exhibited the highest amount of betalains, followed by the red and white ones. Indicaxanthin accounted for about 99% of betalains in the white fruit, while the ratio of betanin to indicaxanthin varied from 1:8 (w:w) in the yellow fruit to 2:1 (w:w) in the red one. Polyphenol pigments were negligible components only in the red fruit. When measured as 6-hydroxy-2,5,7,8-tetramethylchroman-2-carboxylic acid (Trolox) equivalents per gram of pulp, the methanolic fruit extracts showed a marked antioxidant activity. Vitamin C did not account for more than 40% of the measured activity. In addition, the extracts

dose-dependently inhibited the organic hydroperoxide-stimulated red cell membrane lipid oxidation, as well as the metal-dependent and -independent low-density lipoprotein oxidation. The extract from the white fruit showed the highest protection in all models of lipid oxidation. Purified betanin and indicaxanthin were more effective than Trolox at scavenging the [2,2'-azinobis(3-ethylbenzothiazoline-6-sulfonic acid)] diammonium salt cation radical. Cyclic voltammetric measurements show two anodic waves for betanin and indicaxanthin, and differential pulse voltammetry shows three anodic waves for betanin, with calculated peak potentials of 404, 616, and 998 mV, and two anodic waves for indicaxanthin, with peak potentials of 611 and 895 mV. Betanin underwent complex formation through chelation with Cu(2+), whereas indicaxanthin was not modified. These findings suggest that the above betalains contribute to the antioxidant activity of prickly pear fruits.

Cell Mol Neurobiol. 2009 Jun 11. [Epub ahead of print]

Neuroprotective and Antioxidative Effect of Cactus Polysaccharides In Vivo and In Vitro.

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Cactus polysaccharides (CP), some of the active components in *Opuntia millenaria* Haw have been reported to display Neuroprotective effects in rat brain slices. In the present study, we investigated the Neuroprotective properties of CP and their potential mechanisms on brain ischemia-reperfusion injury in rats, and on oxidative stress-induced damage in PC12 cells. Male Sprague-Dawley rats with ischemia following middle cerebral artery occlusion and reperfusion were investigated. CP (200 mg/kg) significantly decreased the neurological deficit score, reduced infarct volume, decreased neuronal loss in cerebral cortex, and remarkably reduced the protein synthesis of inducible nitric oxide synthase which were induced by ischemia and reperfusion. Otherwise, the protective effect of CP was confirmed in in vitro study. CP protected PC12 cells against hydrogen peroxide (H₂O₂) insult. Pretreatment with CP prior to H₂O₂ exposure significantly elevated cell viability, reduced H₂O₂-induced apoptosis, and decreased both intracellular and total accumulation of reactive oxygen species (ROS) production. Furthermore, CP

also reversed the upregulation of Bax/Bcl-2 mRNA ratio, the downstream cascade following ROS. These results suggest that CP may be a candidate compound for the treatment of ischemia and oxidative stress-induced neurodegenerative disease.

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Inhibition of nitric oxide synthase expression in activated microglia and peroxynitrite scavenging activity by *Opuntia ficus indica* var. *saboten*.

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Activated microglia by neuronal injury or inflammatory stimulation overproduce nitric oxide (NO) by inducible nitric oxide synthase (iNOS) and reactive oxygen species (ROS) such as superoxide anion, resulting in neurodegenerative diseases. The toxic peroxynitrite (ONOO⁻), the reaction product of NO and superoxide anion further contributes to oxidative neurotoxicity. A butanol fraction obtained from 50% ethanol extracts of *Opuntia ficus indica* var. *saboten* (Cactaceae) stem (SK OFB901) and its hydrolysis product (SK OFB901H) inhibited the production of NO in LPS-activated microglia in a dose dependent manner (IC₅₀ 15.9, 4.2 microg/mL, respectively). They also suppressed the expression of protein and mRNA of iNOS in LPS-activated microglial cells at higher than 30 microg/mL as observed by western blot analysis and RT-PCR experiment. They also inhibited the degradation of I-kappaB-alpha in activated microglia. Moreover, they showed strong activity of peroxynitrite scavenging in a cell free bioassay system. These results imply that *Opuntia ficus indica* may have Neuroprotective activity through the inhibition of NO production by activated microglial cells and peroxynitrite scavenging activity. Copyright (c) 2006 John Wiley & Sons, Ltd.

Quercetin, a flavonoid, inhibits proliferation and increases osteogenic differentiation in human adipose stromal cells.

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Flavonoids, which have been detected in a variety of foods, have been repeatedly reported to affect bone metabolism. However, the effects of flavonoids on osteoblastogenesis remain a matter of some controversy. In this study, the effects of quercetin on the differentiation and proliferation of human adipose tissue-derived stromal cells (hADSC) were determined. Quercetin was found to increase osteogenic differentiation in a dose-dependent manner. Other flavonoids, chrysin and kaempferol, were also shown to increase the osteogenic differentiation of hADSC, but this stimulatory effect was weaker than that associated with quercetin. Quercetin pretreatment administered prior to the induction of differentiation also exerted stimulatory effects on the osteogenic differentiation of hADSC. RT-PCR and real time PCR analysis showed that quercetin treatment induced an increase in the expression of osteopontin, BMP2, alkaline phosphatase and Runx2. Quercetin inhibited the proliferation of hADSC, but did not affect their survival. The pretreatment of quercetin increased ERK phosphorylation during osteogenic differentiation, although it did not increase ERK activity in control culture condition. ICI182780, an specific estrogen receptor antagonist, failed to inhibit the effects of quercetin on osteogenic differentiation. Quercetin-pretreated hADSC showed better bone regenerating ability in skull defect model of nude mice than naive cells. Our findings indicate that quercetin enhances osteogenic differentiation via an independent mechanism from estrogen receptor (ER) activation, and prove useful for in vivo bone engineering, using human mesencymal stem cells (hMSC).

Phenolic composition, antioxidant capacity and in vitro cancer cell cytotoxicity of nine prickly pear (*Opuntia* spp.) juices.

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Juices of nine prickly pears (*Opuntia* spp.) were characterized in terms of color, acidity, sugar content, phenolics, flavonoids, betalains and antioxidant activity and tested in vitro against four cancer cell lines. The juices had pH s, acidities and sugar ranging from 4.27 to 5.46, 0.03 to 0.27% and 8 to 14.7 degrees Brix, respectively. Juices also varied in color from white to purple and contained total phenolics, flavonoids, betaxanthins, betacyanins and antioxidant capacity ranging from 22 to 226 microg gallic acid eq/g, 95 to 374 microg quercetin eq/g, 3 to 189 microg/g, 1.6 to 300 microg/g and 17 to 25 micromoles Trolox eq./mL, respectively. Among the cancer lines tested, viability of prostate and colon cells were the most affected. Moradillo contained the highest flavonoids and diminished both prostate and colon cancer cell viability without affecting mammary or hepatic cancer cells. Rastrero reduced the growth of the four cancer cell lines without affecting normal fibroblast viability. The research shows intervarietal differences among prickly pears in terms of juice properties and phytochemicals that could prevent oxidative stress and cancer.

Radical scavenging and anti-inflammatory activity of extracts from *Opuntia humifusa* Raf.

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Opuntia humifusa Raf. (*O. humifusa* Raf.) is a member of the Cactaceae family. To determine the antioxidative and anti-inflammatory effects of this herb, various solvent fractions (methanol, hexane, chloroform, ethyl acetate, butanol, and water) prepared from the leaves of cacti were tested using DPPH

(2,2-diphenyl-1-picrylhydrazyl radical) and xanthine oxidase assays, and nitric oxide (NO)-producing macrophage cells. We found that *O. humifusa* Raf. displayed potent antioxidative and anti-inflammatory activity. Thus, all solvent fractions, except for the water layer, showed potent scavenging effects. The scavenging effect of the ethyl acetate fraction was higher than that of the other fractions, with IC50 values of 3.6 and 48.2 microg mL⁻¹. According to activity-guided fractionation, one of the active radical scavenging principles in the ethyl acetate fraction was found to be quercetin. In contrast, only two fractions (chloroform and ethyl acetate) significantly suppressed nitric oxide production from the lipopolysaccharide (LPS)-activated RAW264.7 cells. In addition, chloroform and ethyl acetate fractions significantly blocked the expression of inducible nitric oxide synthetase (iNOS) and interleukin-6 (IL-6) from the RAW264.7 cells stimulated by LPS. Moreover, ethyl acetate fractions significantly blocked the expression of IL-1beta from the RAW264.7 cells stimulated by LPS. Therefore, the results suggested that *O. humifusa* Raf. may modulate radical-induced toxicity via both direct scavenging activity and the inhibition of reactive species generation, and the modulation of the expression of inflammatory cytokines. Finally, *O. humifusa* Raf. may be useful as a functional food or drug against reactive species-mediated disease.

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Constituents of the stems and fruits of *Opuntia ficus-indica* var. *saboten*.

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From the stems and fruits of *Opuntia ficus-indica* var. *saboten*, eight flavonoids, kaempferol (1), quercetin (2), kaempferol 3-methyl ether (3), quercetin 3-methyl ether (4), narcissin (5), (+)-dihydrokaempferol (aromadendrin, 6), (+)-dihydroquercetin (taxifolin, 7), eriodictyol (8), and two terpenoids, (6S,9S)-3-oxo-alpha-ionol-beta-D-glucopyranoside (9) and corchoionoside C (10) were isolated and identified by means of chemical and spectroscopic. Among these isolates, compounds 3-5 and 8-10 were reported for the first time from the stems and fruits of *O. ficus-indica* var. *saboten*.

Neuroprotective effects of antioxidative flavonoids, quercetin, (+)-dihydroquercetin and quercetin 3-methyl ether, isolated from *Opuntia ficus-indica* var. *saboten*.

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The flavonoids quercetin, (+)-dihydroquercetin, and quercetin 3-methyl ether were isolated from the ethyl acetate fractions of the fruits and stems of *Opuntia ficus-indica* var. *saboten*. In the present study, we evaluated their protective effects against oxidative neuronal injuries induced in primary cultured rat cortical cells and their antioxidant activities by using three different cell-free bioassays. Quercetin was found to inhibit H₂O₂- or xanthine (X)/xanthine oxidase (XO)-induced oxidative neuronal cell injury, with an estimated IC₅₀ of 4-5 micro g/ml. However, it was no more protective at concentrations of 30 micro g/ml and above. (+)-Dihydroquercetin concentration-dependently inhibited oxidative neuronal injuries, but it was less potent than quercetin. On the other hand, quercetin 3-methyl ether potently and dramatically inhibited H₂O₂- and X/XO-induced neuronal injuries, with IC₅₀ values of 0.6 and 0.7 micro g/ml, respectively. All three principles markedly inhibited lipid peroxidation and scavenged 1,1-diphenyl-2-picrylhydrazyl free radicals. In addition, quercetin and quercetin 3-methyl ether were shown to inhibit XO activity in vitro, with respective IC₅₀ values of 10.67 and 42.01 micro g/ml. These results indicate that quercetin, (+)-dihydroquercetin, and quercetin 3-methyl ether are the active antioxidant principles in the fruits and stems of *Opuntia ficus-indica* var. *saboten* exhibiting Neuroprotective actions against the oxidative injuries induced in cortical cell cultures. Furthermore, quercetin 3-methyl ether appears to be the most potent neuroprotectant of the three flavonoids isolated from this plant.

Agave Nectar

Agave is a succulent plant native to the Sonora Desert. Agave nectar has become a low calorie sweetener, and is in fact 75% sweeter than sugar. Despite its sweet taste, Agave nectar is a low-glycemic index food. The glycemic index measure how high one's blood sugar rises when certain foods are eaten. Agave Nectar is the recommended natural sweetener in low calorie diets for weight management when it is added to foods and beverages.

- Low glycemic load
- Low in calories
- Safe for diabetics

What is agave?

Agave is a succulent plant, related to the yucca and lily, which grows in the southern and western United States and in central and tropical South America. The agave plants have a large rosette of thick fleshy leaves, each ending generally in a sharp point.

Each agave rosette grows slowly and flowers only once. When the agave is ready to flower, a tall stem grows from the center of the leaf rosette and produces a large number of short tubular flowers. After development of the fruit, the original plant dies, but shoots are frequently produced from the base of the stem which becomes new plants.

Four major parts of the agave plant have culinary uses. The flowers are edible and can be tossed in salads. The leaves are rich in sap and can be eaten. The stalks can be roasted before they flower and exude a distinctive sweet molasses-like flavor. Sap that is used as sweetener comes from the flower shoots.

Agave syrup is a low-glycemic sweetener

Agave, as compared to other sweeteners, has a desirable low-glycemic index. This means that when consumed, it won't cause a sharp rise or fall in blood sugar.

Here is a list of sweeteners and corresponding glycemic values. The higher the value, the bigger the impact on blood sugar.

GLYCEMIC				VALUES
Organic		Agave	Nectar	27
Fructose		(fruit	sugar)	32
Lactose		(milk	sugar)	65
Honey				83
High	fructose	corn	syrup	89
Sucrose		(sugar)		92

Glucose		137
Glucose	tablets	146
Maltodextrin		150
Maltose		150

Source:

BlueAgaveNectar.com

There is about ½ teaspoon of Agave nectar per serving of Nopalea. If you are diabetic and monitor your food exchanges, a one-teaspoon serving of agave nectar equals a “free food.” Two teaspoons of Agave Nectar (the amount in 4 ounces of Nopalea) equals 1/2 carbohydrate exchange.

Health benefits of agave nectar

Agave contains saponins and fructans. Saponins have anti-inflammatory properties, including antimicrobial capability. In fact, the Aztecs used agave syrup to treat wounds because of its antibacterial properties. (1)

Inulin is a type of fructan or fiber that has many health benefits. Studies suggest that inulin can be effective in weight loss because of its low impact on blood sugar and its ability to increase satiety and decrease appetite. Inulin is also associated with lowering cholesterol, reducing the risk of certain cancers, and increasing the absorption of nutrients, such as isoflavones, calcium and magnesium. (2)

1. Anti-inflammatory activity of aqueous extracts and steroidal sapogenins of Agave Americana. *Planta Med.* 1997 June; 63(3):199-202. Peana AT, Moretti MD, Manconi V, Desole G, Pippia P. Dipartimento di Scienze del Farmaco, Università di Sassari, Italy.
2. Physiological effects of dietary fructans extracted from Agave tequilana Gto. and *Dasyilirion* spp. *Br J Nutr.* 2008 Feb;99(2):254-61. Epub 2007 Aug 22. **Urías-Silvas JE, Cani PD, Delmée E, Neyrinck A, López MG, Delzenne NM.** Unidad de Biotecnología e Ingeniería Genética de Plantas, CINVESTAV-IPN Unidad Irapuato, A.P. 629, Irapuato, Gto., 36500, México.

Anti-inflammatory activity of aqueous extracts and steroidal sapogenins of *Agave Americana*.

Peana AT, Moretti MD, Manconi V, Desole G, Pippia P.

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Lyophilized aqueous extracts obtained from *Agave Americana* L (Agavaceae) collected in the north of Sardinia were characterized with regard to their steroidal sapogenins content. Extracts of *A. Americana* and genins isolated from them were evaluated for anti-inflammatory properties by testing their effects on carrageenin-induced edema. The effect of orally administered genins on gastric mucous membranes was also assessed. Lyophilized extracts administered by the intraperitoneal route at doses equivalent to 200 and 300 mg/kg of fresh plant starting material, showed good anti-inflammatory activity. Doses of genins (total steroidal sapogenins, hecogenin and tigogenin) equivalent to the amount in the lyophilized extracts produced an antiedematous effect which was much stronger and more efficacious than that obtained with an i.p. administration of 5 mg/kg of indomethacin or dexamethasone 21-phosphate at a dose equivalent to the molar content of hecogenin administered. At the doses used to evaluate the anti-inflammatory activity, the genins did not have any harmful effect on the gastric mucous membranes. Lesions occurred when significantly higher doses of hecogenin were given, but gastric damage was still less than that caused by the drugs used for comparative purposes.

Br J Nutr. 2008 Feb;99(2):254-61. Epub 2007 Aug 22.

Physiological effects of dietary fructans extracted from *Agave tequilana* Gto. and *Dasyilirion* spp.

Urías-Silvas JE, Cani PD, Delmée E, Neyrinck A, López MG, Delzenne NM.

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Recent data reported that inulin-type fructans extracted from chicory roots regulate appetite and lipid/glucose metabolism, namely, by promoting glucagon-like peptide-1 (GLP-1) production in the colon. The *Agave* genus growing in

different regions of Mexico also contains important amounts of original fructans, with interesting nutritional and technological properties, but only few data report their physiological effect when added in the diet. Therefore, we decided to evaluate in parallel the effect of supplementation with 10 % agave or chicory fructans on glucose and lipid metabolism in mice. Male C57Bl/6J mice were fed a standard (STD) diet or diet supplemented with Raftilose P95 (RAF), fructans from Agave tequilana Gto. (TEQ) or fructans from Dasyilirion spp. (DAS) for 5 weeks. The body weight gain and food intake in mice fed fructans-containing diets were significantly lower than the ones of mice fed the STD diet, TEQ leading to the lowest value. Serum glucose and cholesterol were similarly lower in all fructans-fed groups than in the STD group and correlated to body weight gain. Only RAF led to a significant decrease in serum TAG. As previously shown for RAF, the supplementation with agave fructans (TEQ and DAS) induced a higher concentration of GLP-1 and its precursor, proglucagon mRNA, in the different colonic segments, thus suggesting that fermentable fructans from different botanical origin and chemical structure are able to promote the production of satietogenic/incretin peptides in the lower part of the gut, with promising effects on glucose metabolism, body weight and fat mass development.

Sonoran Bloom Blend:

All experts agree that the best way to get the phytonutrients we need is from whole foods. Nopalea is a whole-food, Superfruit juice blend. The following fruit and vegetables juices were added to enhance the flavor profile and drinkability of Nopalea. Many of these foods have known health values, such as pomegranate for the heart, cranberry for the kidneys and bilberry for the eyes. However, all of these Superfoods belong in a healthy diet.

Grape Seed extract

Helps reduce swelling associated with injuries or surgery. Evidence suggests that it strengthens the collagen which is helpful for aging skin, as well as reducing symptoms of swelling and fluid retention. (1)

Raspberry Extract

It has been regarded as a remedy for wounds and inflammation associated with ulcers and gum inflammations as well as for its diuretic properties. (2)

Strawberry Extract

Strawberries have been used to reduce inflammation. It has also been used as a natural astringent for sore throat and ulcers. (3)

Cranberry Extract

Cranberries have long been associated with the treatment of Urinary Tract Infections (UTI). The proanthocyanidins found in cranberry differ from those found in other plants by their unique structures and very potent antibacterial activity. In the case of UTIs, these proanthocyanidins prevent *E. coli* from adhering to the urethra and bladder. (4)

Apple Extract

Apples contain a large number of flavanoids as well as other phyto-chemicals which have been associated with the treatment of cardiovascular disease and asthma. Recent research evaluated the anti-allergic effect of apple condensed tannins (ACT) in patients with atopic dermatitis. (5)

Apricot Extract

Ripe apricots aid the digestive tract because of its alkaline reaction to the digestive system. Apricots also contain cobalt, which is a precursor to vitamin B-12 and necessary in the treatment of anemic conditions. (6)

Mango Fruit Extract

Mangos strengthen the gums and help dental problems, dry cough and bronchial congestion. It strengthens & invigorates all the nerves tissues, brain, heart & other parts of the body. (7)

Orange Juice Concentrate

In traditional medicine, oranges were used for indigestion and abdominal pain, easing inflammation, bruising and muscle pains. (8)

Papaya Fruit Concentrate (w/ Papain)

Papaya contains vitamin A, potassium, folate, as well as lutein and zeaxanthine which helps protect our eyes. Papain has been employed to treat ulcers, reduce swelling, fever and adhesions after surgery. (9)

Tomato Fruit Concentrate

Tomatoes, which are actually a fruit and not a vegetable, are loaded with all kinds of health benefits. Research is now slowly proving that there is a high likelihood that the consumption of tomatoes and tomato based products actually may prevent serum lipid oxidation and reduce the risk of macular degenerative disease. (10)

Kiwi Concentrate

This fruit is rich in phyto-nutrients which prevent abnormal blood clotting and control triglyceride levels in your blood. (11)

Guava Powder

The health benefits of guava include reducing high blood pressure and increasing weight loss. Guava contains Lycopene which reduces the risk of cancer. (12)

Lemon Juice Concentrate

Lemon is a diuretic. This means it is good for people with urinary tract infections and high uric acid levels, such as those with arthritis or rheumatism because it helps flush out all the toxins and bad bacteria. (13)

Prickly Pear Concentrate

Prickly Pear has a number of uses as an anti-inflammatory, anti-toxin and diuretic as well as an antioxidant. For men, Prickly Pear helps reduce prostate enlargement, and in men and women it reduces intestinal inflammation as well as kidney and liver problems. It reduces the risk oxidative damage. (14)

Peach Juice Concentrate

Peach Juice has a number of properties that reduce the inflammation of Gastritis (inflammation of the stomach), Nephritis (inflammation of the kidneys), and Bronchitis (inflammation of the lungs). (15)

Pomegranate Extract (Ellagic and Punicaligins)

Pomegranates have very high content of punicalagins, a potent anti-oxidant. Pomegranate reduces the oxidation of LDL “bad” cholesterol and fights hardening of the arteries as well as a number of other vascular conditions. (16)

Green Tea Extract (90% Polyphenols)

Green tea contains a powerful family of antioxidant polyphenols that act as a strong anti-carcinogenic. It not only has helped in reducing the risk of diabetes and heart disease, but also has helped with periodontal disease associated with gum inflammation. (17)

Beet Juice

Traditionally, Beet juice has been used in the treatment of jaundice, hepatitis, nausea and vomiting due to biliousness, diarrhea and dysentery. It is valuable in the treatment of hypertension, arteriosclerosis, heart trouble and varicose veins. (18)

Bilberry Concentrate

Antioxidants scavenge damaging particles in the body known as free radicals, helping to prevent or reverse damage to cells. Studies have found that anthocyanosides from Bilberry may strengthen blood vessels, improve circulation, and prevent the oxidation of LDL ("bad") cholesterol, a major risk factor for atherosclerosis. (19)

Acerola Cherry Extract

Acerola contains one of the richest sources of vitamin C and bioflavonoids. Traditionally, its fruit has been used to treat arthritis, fevers, and kidney, heart, and liver problems. (20)

Amylase, Cellulose, Hemi-Cellulose

Amylase is an enzyme made primarily by the pancreas and salivary glands. It is an enzyme that aids in the digestion of starch. Overall these enzymes help reduce inflammation, allergies, osteoarthritis as well as Chronic Musculoskeletal Pain. (21)

Proteases

These Proteases aid in digestion of protein in food. Additionally, proteases have long been used to reduce inflammation following an injury as well as in promoting wound healing. They can also play roles in speeding up metabolism. (22)

Stevia Leaf Extract

This is not only an alternative sweetener, stevia leaf also aids in reducing the risk of diabetes and hypertension. (23)

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