



# Goji & Noni

## A Review of Two Traditional Medicinal Juices

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Literature Education Series On Dietary Supplements

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After reviewing information on various websites and from brochures of some multi level marketing companies, gullible readers might believe that the traditional medicinal juices Goji and Noni are panaceas, capable of curing any disease or medical condition known to mankind. A more discriminating reader, however, might examine the claims being made with a more skeptical eye.

Although there is value associated with the use of Goji and Noni juices, the fact is that it's hard to separate fact from fiction when it comes to the myriad health claims being made about them. The purpose of this article is to provide readers with a comprehensive review the scientific data and traditional (historical) use of Goji and Noni, in order to make an informed decision about whether the use of these products are appropriate for them. Let's start out by examining the background and traditional use of these juices, and then we'll take a look at the scientific research that has been performed on them.

### BACKGROUND & TRADITIONAL USE

#### Goji

According to Mindell and Handel<sup>1</sup>, the people of Central Asia love and cherish Goji berries so much that they devote two weeks every year to festivals in their honor. Mindell and Handel also indicate that Goji was extolled in the *Divine*

*Farmer's Handbook of Natural Medicine* (Shen Nong Ben Cao) in the first century A.D. Goji is native to Asia and has been introduced into some of parts of the U.S. Its botanical name is *Lycium barbarum*. *Lycium* refers to the ancient country of Lycia in Asia Minor; *barbarum* may refer to Barbary, an old name for part of northern Africa.<sup>2</sup>

Goji has a long history of medicinal use, both as a general, energy restoring tonic and also to cure a wide range of ailments from skin rashes and eyesight problems to diabetes.<sup>3</sup> A tonic tea is made from the leaves.<sup>4</sup> A sweet tonic decoction is also made from the fruits is used to lower blood pressure and blood cholesterol levels.<sup>5</sup> It is said to act mainly on the liver and kidneys.<sup>6 7 8</sup> The fruit is taken internally in the treatment of high blood pressure, diabetes, poor eyesight, vertigo, lumbago, impotence and menopausal complaints.<sup>9</sup> The fruit is harvested when fully ripe and is dried for later use.<sup>10</sup>

The root bark is a bitter, cooling, antibacterial herb that controls coughs and lowers fevers, blood pressure and blood cholesterol levels.<sup>11 12</sup> It is taken internally in the treatment of chronic fevers, internal haemorrhages, nosebleeds, tuberculosis, coughs, asthma etc.<sup>14</sup> It is applied externally to treat genital itching.<sup>15</sup> The bark is harvested in the winter and dried for later use.<sup>16</sup>

#### Noni

Indigenous to Southeast Asia, Noni (*Morinda citrifolia*) was domesticated and cultivated by Polynesians, first in Tahiti and the Marquesas, and eventually in the farthest outpost of their culture, Hawaii. Today Noni ranges from Tahiti to India, and grows in the Caribbean, South America and the West Indies. Its broad dispersal speaks of its value to traditional

cultures. In fact, Noni has an extensive history of effective medicinal use by many of the aforementioned cultures, despite the fact that it has a rancid smell and taste when fully ripe (sometimes described as “cheesy”).<sup>17</sup>

In traditional plant-based medicine, the fruit, flower, leaves, bark and root of *Morinda citrifolia* have all been employed for diverse medicinal purposes. In Polynesia, Noni leaves have a long history of topical use in poultices and mixed with oil, for the treatment of rheumatic pain, inflammation, neuralgia, ulcers, gout, cough and cold, boils and ringworm. In Hawaii, the leaves of the tree were mashed with other plants and applied to deep wounds.

In Polynesia, the fruit was also prepared for topical use, sometimes juiced and mixed with salt or sliced and applied to boils. In Hawaiian traditional medicine, Noni fruit was crushed and mixed with other plants and applied to bruises, sprains and swollen limbs. The Hawaiians also made a digestive aid with crushed Noni fruit by combining it with cane juice. The fruit was also part of formulas for cleansing, which also included cane juice and other plants. By the 1930's Noni fruit was used more widely for internal purposes, including intestinal worms, weakness and respiratory disorders. Since that time the juice of the ripe fruit has also been used as a folk remedy to help stabilize blood sugar in cases of adult diabetes.<sup>18 19</sup>

## SCIENTIFIC RESEARCH ON GOJI

### **Anti-cancer/immune-enhancing properties**

Scientists can produce large numbers of active, cancer-fighting T cells in the lab by treating a small number of T cells in a test tube with a cytokine (an immune system hormone) called interleukin-2 (IL-2). After being returned to a patient's bloodstream, these special cells, called lymphokine-activated killer (LAK) cells, are more effective against cancer cells.<sup>20</sup>

So what does this have to do with Goji? Just this: Advanced cancer patients in a clinical trial<sup>21</sup> were treated with LAK/IL-2 combining with polysaccharides from Goji (i.e., *Lycium barbarum* polysaccharides or LBP). Initial results of the treatment from 75 patients indicated that regression of cancer was achieved in patients with malignant melanoma, renal cell carcinoma, colorectal carcinoma, lung cancer,

nasopharyngeal carcinoma, malignant hydrothorax. The response rate of patients treated with LAK/IL-2 plus LBP was 40.9% while that of patients treated with LAK/IL-2 was 16.1% ( $P < 0.05$ ). The average remission in patients treated with LAK/IL-2 plus LBP also lasted significantly longer. LAK/IL-2 plus LBP treatment led to more marked increase in natural killer and LAK cell activity than LAK/IL-2 without LBP. The results indicate that LBP can be used as an adjuvant in the biotherapy of cancer.

In addition to this clinical study, animal research has also shown benefits from Goji polysaccharides (LBP) in combination with a cancer therapy. When given to mice with Lewis lung cancer that were treated with radiation, the LBP had radiosensitizing effects. That means that it enhanced the effects of radiation against the cancer. Furthermore, the LBP had low toxicity.<sup>22</sup>

Chemotherapy or radiation therapy for cancer often results in the suppression of white blood cells (WBC). This is a problem since a suppressed WBC count means a weakened immune response making it harder for the body to fight off other infections. However, when mice treated with chemotherapy or radiation also were treated with LBP, the LBP largely ameliorated the suppression of WBC.<sup>23</sup>

Besides the human study and two animal studies just reviewed, in-vitro (i.e., “test-tube”) studies have also been conducted using LBP on cancer cell lines. For example, LBP has been shown to inhibit the proliferation of human liver cancer cells, and induce apoptosis (i.e., cell death) of those same cancer cells.<sup>24</sup> LBP has also been shown to inhibit the growth of human leukemia cells.<sup>25</sup>

Goji's exact mechanism of action for having these synergistic effects with cancer therapies is not known for certain. However, it may have to do with its immune-enhancing properties. These properties were demonstrated in one in-vitro study<sup>26</sup> where LBP increased the production of the immune system proteins interleukin-2 and tumor necrosis factor-alpha. Likewise, in another in-vitro study<sup>27</sup>, Goji extract increased the production of lymphocytes (important white blood cells involved in immunity).

### **Antioxidant properties**

Goji has been shown to be rich in antioxidants.<sup>28</sup> In one study<sup>29</sup>, Goji flavonoids or TFL (total flavonoids of Lycium) were shown to protect red blood cells and mitochondria (the energy producing structures in cells) from oxidative damage. Similarly, TFL were also shown to protect certain white blood cells from oxidative damage.<sup>30</sup> Research has even shown that LBP protected frog eggs from oxidative damage by free radicals.<sup>31 32</sup> Zeaxanthin, one of the antioxidants that Goji contains, may even help promote eye health.<sup>33</sup> Research has certainly shown that zeaxanthin from Goji is well absorbed in humans.<sup>34 35</sup>

Given its antioxidant properties, researchers speculated that Goji might be beneficial for human skin. To test this, an experiment was conducted in which LBP were found to promote the survival of human fibroblasts (connective tissue cells), suggesting important skin-protective properties.<sup>36</sup>

### **Antidiabetic properties**

In Traditional Chinese Medicine, Goji has been used for diabetes mellitus and its complications.<sup>37</sup> Modern animal research<sup>38</sup> has verified Goji's blood sugar lowering effects. Likewise Goji's antioxidant properties may explain its effects in protecting against diabetic complications.<sup>39</sup>

### **Other properties**

Additional research has shown that Goji has other beneficial properties. The results of one study suggested Goji can serve as potential neuroprotection agent against neuronal (nerve cell) death in Alzheimer's disease.<sup>40</sup> Other animal research has shown that Goji protect DNA from damage<sup>41</sup>, and accelerate the rate of DNA synthesis.<sup>42</sup> Research has also shown that Goji has liver protection properties comparable to that of Milk Thistle<sup>43</sup>, the premium liver herb. In animal research, LBP induced a remarkable adaptability to exercise load, enhanced resistance and accelerated elimination of fatigue while enhancing the storage of muscle and liver glycogen.<sup>44</sup> In another animal study<sup>45</sup>, LBP was shown to prevent an increase in blood pressure in hypertension rats.

An extensive literature search failed to find scientific evidence to support marketing claims that Goji is the fountain of youth, or the most

powerful anti-aging food, or that it is the most nutritionally dense food on the planet.

### **The phytochemicals in Goji**

Goji is rich in its natural phytochemical content. As previously discussed, Goji contains polysaccharides<sup>46</sup>, flavonoids<sup>47</sup> and zeaxanthin.<sup>48</sup> Research<sup>49</sup> has shown that Goji contains other carotenoids (besides zeaxanthin), riboflavin, ascorbic acid, thiamine, nicotinic acid, glycoconjugates, several monosaccharides and 17 amino acids. Other research<sup>50</sup> has shown that Goji contains a novel stable precursor of ascorbic acid (vitamin C), called 2-O-(beta-D-glucopyranosyl)ascorbic acid.

### **Possible drug interaction**

Based upon the results of a single case study<sup>51</sup>, it is possible that there is an interaction between Goji and the drug warfarin.

### **Which type of Goji supplement is best to use?**

Traditionally, Goji has been used as a berry juice. Translating a juice into a dietary supplement, however, may not be as simple as it seems since the juice would have to be pasteurized in order to put into a bottle. Since pasteurization involves heating, it is possible that the juice may not have some of its same traditional properties. A better choice may be to prepare an extract of Goji, which is a preparation method used in herbal medicine for thousands of years, and still currently used. What's more is that an extract can be prepared that is standardized for Goji's polysaccharide fraction. (LBP). This is significant since a substantial amount of the Goji scientific research was conducted LBP. Furthermore, the liquid can be evaporated out of an extract, which allows the remaining concentrate to be put into a tablet or capsule form for convenience of administration. A Goji product which is standardized for 40% polysaccharides is likely to yield positive health benefits.

## **SCIENTIFIC RESEARCH ON NONI**

### **Anti-cancer/ immune-enhancing properties**

Like Goji, Noni has also been shown to have anti-cancer/immune-enhancing properties. In research conducted on cancerous mice, Noni juice was able to significantly increase the life span of the treated mice (from 105% to 123%). The research team concluded that the Noni juice "seems to act indirectly by enhancing host

immune system involving macrophages and/or lymphocytes.<sup>52</sup> In another study, the compound damnacanthal found in Noni was found to inhibit *Ras cells*—a precursor to certain types of cancer.<sup>53</sup> Most recently, research has shown that a polysaccharide found in Noni, Noni-ppt, has anti-tumor activity. As a matter of fact, when combined with sub-optimal doses of standard chemotherapeutic agents, Noni-ppt improved survival time and demonstrated curative effects in mice.<sup>54</sup>

### **Analgesic and sedative properties**

Traditionally, Noni has been used as an analgesic (pain reliever) and sedative. To test these uses scientifically, researchers conducted various experiments on mice, and found out that Noni did, in fact, demonstrate significant, non-toxic, analgesic activity. Their testing also suggested that Noni has sedative properties. The conclusion of this study included a statement from the authors: “These findings validate the traditional analgesic properties of this plant.”<sup>55</sup>

### **Antimicrobial / insecticidal properties**

Noni has been used traditionally to treat bruises, sprains and other external injuries. This topical use of Noni is supported by recent research that confirms some antimicrobial activity against *Candida albicans*, *Cryptococcus neoformans*, and *Trichophyton rubrum*, and other antiseptic and antimicrobial effects.<sup>56</sup> Furthermore, a high content of the fatty acid octanoic acid account for insecticide activity in the fruit pulp of Noni<sup>57</sup>, and support its traditional use as an insecticidal shampoo.

### **Other potential properties**

An extensive literature search failed to find scientific evidence to support some of Noni’s traditional uses in the prevention of therapy of diabetes, cardiovascular diseases and a myriad of other conditions for which it is used today. The problem is that even when patients are monitored by “objective” standards—blood pressure, serum glucose, and cholesterol measures—and attribute their normalizing values to Noni, it cannot be established with certainty that diet, exercise, and pharmaceuticals are not responsible as well, or instead. At the same time, considering the positive discoveries that have been made with Noni fruit so far, there is excellent reason to think that further studies will prove the fruit and its preparations beneficial to health in numerous ways. Noni is a

valuable medicinal plant, there’s no doubt about it. Yet we have a great deal more to learn about what the plant contains and how it works.

### **The phytochemicals in Noni**

The phytochemical content of Noni fruit, or at least what is understood of it, only goes so far to justify the health claims currently being made. The fruit contains a concentration of anthraquinones including the aforementioned damnacanthal, which possess purgative activity. This may account for the “cleansing” effect described by many users. Certainly in cases of sluggish digestion and slow moving bowels, Noni can exert a stimulating and thereby beneficial effect, helping to increase peristalsis and cleanse the colon. Noni fruit also contains a concentration of vitamin A, as well as the aforementioned fatty acid, octanoic acid. Analysis shows the presence of numerous other fatty acids as well, including linoleic, oleic, acetic and palmitic acids. The fruit contains esters, ketones, lactones and alcohols. The presence of these agents, or synergy between them, may prove additionally antimicrobial, anti-inflammatory, anti-carcinogenic and immune-enhancing.

### The xeronine controversy

In the 1980’s researcher Ralph Heinecke reported the discovery of a novel agent in Noni dubbed xeronine, ostensibly responsible for the plant’s miraculous healing effects. His findings have been exploited heavily by multi level marketers, and Heinecke continues to support Noni and has lent his approval to one commercial product. However, biochemists familiar with the research dismissed it almost immediately as methodologically flawed. Heinecke’s findings have not been confirmed by other researchers, who continue to regard “xeronine” as suspect.<sup>59</sup>

### **Which type of Noni supplement is best to use?**

Then too, there is the matter of which form to consume. In Hawaii and other parts of Polynesia, Noni is put into a container, where it quickly decomposes and ferments. The pungent amber juice which remains at the top of the fermented fruit is consumed daily as a prophylactic. But most people can’t get hold of fresh fermented Noni juice. So how will Noni translate effectively into products that work far away from the islands? Although further studies on the various forms of Noni, dried, freeze-

dried, or liquid, need to be performed to establish efficacy, at this time the most sensible alternative to fresh Noni juice is freeze-dried Noni. The freeze-dried form seems most likely to replicate the phytochemical constituents in fresh Noni and, consequently, its medicinal value. In fact, according to “Medicine Hunter” Chris Kilham<sup>60</sup>, one anti-inflammatory study found that while freeze-dried Noni shows significant anti-inflammatory value, bottled Noni juice (which is typically pasturized) shows none.

## CONCLUSION

Although Goji and Noni may not live up to some of the marketing claims being made about them, they are still good supplements with potential health benefits. In short, Goji has verified anti-cancer/immune-enhancing properties, antioxidant properties, anti-diabetic properties, neuroprotective properties, DNA protective properties, liver protective properties, anti-fatigue properties, and may help reduce hypertension. Noni has anti-cancer/ immune-enhancing properties, analgesic and sedative properties, antimicrobial/insecticidal properties, and may have other potential properties as well. Some of the properties of Goji and Noni have been verified in human research, while other properties have been verified in animal or in-vitro research. Please keep this in mind if you are planning on using Goji or Noni separately or in combination for specific properties.

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