

# LYCIUM FRUIT

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Lycium fruit is an herb derived from *Lycium chinense* and *Lycium barbarum*, common plants of eastern Asia. The root bark of the same plants is also used medicinally throughout Eastern Asia. *Lycium* is in the Solanacea family that gives us hot peppers, eggplants, potatoes, tomatoes, and other food items. The fruit is known by the Chinese name *gouqizi*, and has been used since ancient times, recorded in the earliest existing Chinese materia medica published around 100 A.D.

## TRADITIONAL AND MODERN USES

Traditionally, lycium fruit is described as having the properties of nourishing the blood, enriching the yin, tonifying the kidney and liver, and moistening the lungs. It is applied in the treatment of such conditions as consumptive disease accompanied by thirst (includes early-onset diabetes and tuberculosis), dizziness, blurred vision, diminished visual acuity, and chronic cough. Several modern clinical trials for treatment of bone marrow deficiency conditions (low production of red blood cells, platelets, or white blood cells) include lycium fruit in a complex prescription for alleviating the disorder.

When making a decoction (tea prepared by boiling the herb in water), 6-18 grams of fruit are used for a daily dose, usually in combination with other herbs, for one to three months as a typical course of therapy (lycium is also used in anti-aging formulas, consumed for years). In the treatment of atrophic gastritis (weakened digestion due to reduced activity of the stomach cells), it has been used by having the patients consume the whole fruits in the amount of 10 grams each time, twice daily before meals (for two months). In the treatment of diabetes, steamed lycium fruit is eaten in the dose of 10 grams each time, three times daily (steaming softens the fruits). Thus, the daily dosage range of 10-30 grams is typical of medical applications in China.

## CONSTITUENTS AND PHARMACOLOGY

The fruit contains beta-carotene, vitamin C, vitamins B<sub>1</sub> and B<sub>2</sub>, beta-sitosterol (an anti-inflammatory agent), linoleic acid (a fatty acid), immunologically active polysaccharides (5-8%), sesquiterpenoids (cyperone, solavetivone), tetraterpenoids (zeaxanthin, physalin), and betaine (0.1%).

Chinese pharmacological research, conducted during the past forty years, revealed that lycium extracts administered to mice could enhance non-specific immunity, promote production of red blood cells, increase production of interleukin-2 (IL-2), and reverse the inhibition of white blood cells caused by cancer drugs. The principal active components are polysaccharides, betaine, and physalin.

In a review of research on lycium fruit appearing in **Recent Advances in Chinese Herbal Drugs**, Dr. Zhou Jinhua points out that polysaccharides from lycium fruit, like those from astragalus and ganoderma, enhance cell-mediated and humoral immune responses. In a dose of just 5-10 mg/kg daily for one week, lycium fruit polysaccharides could increase activity of T cells, cytotoxic T cells, and natural killer cells in laboratory animals. The amount of polysaccharides in lycium fruit of the soft edible variety is probably not more than 5%, so this amount corresponds to a human dosage of about 7-14 grams of the whole fruit. In a study of lycium, reported in the Journal of the Beijing Medical University (1992), it was noted that lycium fruit reduced antibodies associated with allergy-type reactions, which was presumed to be accomplished through the mechanisms of promoting CD8 T cells and regulating cytokines. Probably as a result of this activity, lycium fruit has been reported to be a useful treatment for psoriasis.

Several plant polysaccharides have been shown to enhance IL-2 production; the enhancing effect of lycium polysaccharides on IL-2 activity was reported by the Institute of Pharmacology and Toxicology in Beijing (1989). In the U.S., IL-2 has been under study as an immune promoting factor since 1983, used for some cancers and for HIV infection.

Betaine, when added to chicken feed, enhances growth of the animals and egg production, and it is currently used in poultry farming because of these effects. Lycium fruit given to rats lowered their blood cholesterol and blood sugar; given to rabbits, it inhibited the formation of atherosclerosis. Betaine was shown to protect the livers of laboratory animals from the impact of toxic chemicals; other pharmacologic studies have shown that it is an anticonvulsant, sedative, and vasodilator.

In 1974, it was reported that betaine could treat various chronic liver diseases; lycium fruit is often administered with another Chinese herbal fruit, schizandra, for that purpose. In recent years, betaine has been included in some Western nutritional supplement products, especially those used for improving muscle mass. Betaine is an alkaloid, sometimes classed as an amino acid, that is found also in capsicum, silybum (the source of the liver-protective flavonoid silymarin), and beets (*Beta vulgaris*, from which betaine gets its name). Betaine is used by the liver to produce choline, a compound which calms nervousness, enhances memory, and protects against fatty liver disease. In the sugar beet, which is the commercial source of the isolated compound, betaine is present at a level of 0.3-0.7%.

Another plant in the Solanaceae family, *Physalis angulata*, contains physalin (one of the lycium ingredients) as a major active component. The herb is used as a treatment for hepatitis B. Extracts of physalis have been shown to increase splenic natural killer cell activity in normal and tumor-bearing mice, with anticancer effects for several cancer lines.

Lycium fruit has been given to treat sexual impotence. It was reported that by taking lycium fruit orally and in the form of an alcohol extract, it could markedly increase androgen levels in the blood, making patients feel more energetic. It is likely that sitosterols or terpenoids are responsible for this effect. The daily dosage of lycium fruit needed to obtain these effects is about 10 grams/day.

Like other commonly eaten fruits, lycium is non-toxic. Toxicity studies showed that *injection* of 2.4 grams/kg of lycium fruit extract did not cause adverse reactions, but at the huge dosage of 25 g/kg, toxic reactions were rapid. The LD50 was determined to be about 8.3 grams/kg (about one pound of the dried fruit, extracted and injected, for a human).

## **LYCIUM AS A SOURCE OF IMMUNE-ENHANCING POLYSACCHARIDES**

In a review of immune enhancing polysaccharides (ITM, 1993), it was suggested that a daily dose of about 3.5 grams per day of active polysaccharides would be a reasonable minimum dosage to accomplish substantial effects in relation to inhibiting cancer or chronic viral infection. A similar dosage level, 3.0 grams/day, was determined recently at Sloan-Kettering Cancer Institute (personal communication). To obtain this amount solely from eating lycium fruit (assuming 5% polysaccharides) might be difficult: the daily dose would be 60-70 grams. However, if the lycium fruit is taken along with other polysaccharide-rich supplements, it can represent an important contribution to the desired total daily dose. The good taste of lycium fruit, and the ability to consume it directly-cooked in foods, included in herbal wines, and in tablets-makes it an ideal source. It is also inexpensive. A daily dose of about 30-35 grams of the fruit in crude form has a cost of only about a dollar. Experience of more than 300 patients at the Immune Enhancement Project in Portland shows that adverse reactions to lycium fruit do not occur with the dosages suggested above, confirming the reports from China.

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### **About Subhuti Dharmananda**

Subhuti Dharmananda received his Ph.D. in Biology from the University of California in 1980. He has been an editor, reviewer, and contributor to several journals involved with traditional medicine, including the International Journal of Oriental Medicine, the Protocol Journal of Botanical Medicine, and Herbalgram.

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