

Sacred Lotus



BOTANY

Nelumbo nucifera Gaertn. (*Nelumbium nelumbo* Druce) from the family of the Nymphaeaceas.

Sacred Lotus is an aquatic rhizomatous plant, it grows up to a height about 2 m. The roots of sacred lotus are firmly planted in the mud beneath the water surface and the plant has long stems to which the leaves and flowers are attached. The big circular leaves are floating at the surface and the flowers above it. Its rounded leaves can reach up to 50 cm in diameter. The first leaves that appear, few in number, are flat and float on the surface. They are followed by thicker, funnel-shaped green leaves with slightly wavy edges that may stand from 50 cm to 2 meters above the water. . The flower stalk rises above the leaves. Ranging in diameter from 15 to 25 cm, lotus flowers have more than 20 petals. The flowers are solitary, large and perfumed, with pink-red-carmine petals. The center of the flower has a cone-shaped receptacle. The seeds develop from ovules located in the cone-shaped receptacle. There are a lot of yellow stamens around this cone.

This plant is native to the Asian tropics, the lotus was brought to China and Egypt thousands of years ago. From China it was taken to other parts of Asia including Japan and northern Australia. Formerly thought to belong to the Pond Lily (Nenuphar) family, lotus is now a genus on its own and is classified into two species, the South Asian lotus (*Nelumbo nucifera*) and the American lotus (*Nelumbo lutea*), depending on the geographical distribution.

Sacred Lotus extract is obtained from the flowers of *Nelumbo nucifera* Gaertn.

CHEMISTRY

Flowers typically contain flavonoids such as hyperoside, quercetin, isoquercetin, kemferol-3-glucuronide, luteolin, quercetin-3-glucuronide and isorhamnetin glucoside.

Sacred lotus stamens contain two isorhamnetin glycosides, designated as nelumboside A and nelumboside B, as well as the previously-characterized isorhamnetin glucoside and isorhamnetin rutinoside (Hyun, 2006).

The volatile fraction of lotus flower has been analyzed by gas chromatography. Thirty-two components were isolated from the stamens, the most abundant ones being 1,4-dimethoxybenzene and trans- β -caryophyllene. Thirty components were isolated from the petals, the most important ones being pentadecane, 1-pentadecene and α -terpineol.

The seeds contain 10.6-15.9% protein, 1.9-2.8% lipids and 70-72% carbohydrates. They also contain saponins, phenol compounds and minerals. The root contains 1.7% protein, 9.7% carbohydrates and alkaloids (nuciferine, romerine, O-nornuciferine, anonaine, lirodenine, dihydronuciferine, pronuciferine, anneparine, N-methylcoclaurine and N-methylisococlaurine). The leaves also contain alkaloids (liensinine, isoliensinine, neferine, lotusine, methylcoripalline and dimethylcoclaurine) and flavonoids.



TRADITIONAL USES

The Lotus has been blooming in marshes and ponds long before the emergence of humankind, and is mentioned in ancient texts such as the Old Testament, *Shi-King* (Chinese Book of Songs), and *Kojiki* (Old Legends of Japan). Its Japanese name "hasu" derives from the Japanese word for "beehive" (hachisu), since its receptacle looks just like one. The lotus flower is considered one of the most beautiful flowers on earth, with a most exquisite fragrance. True enough, in India, beautiful women are often compared to a lotus flower, and are called Padmin, which means the "Lady of the Lotus"



The Lotus, one of the oldest aquatic plants on earth, has long been revered for its inspiring beauty and fragrance. Buddhism borrowed the flower from Hinduism. In Buddhist painting and sculpture, whenever Buddha is shown delivering an important sermon, he is shown sitting on a lotus pedestal. Buddhist scriptures enumerate fragrance, purity, delicateness and beauty as the attributes of lotus. Indian literature abounds in references to the flower.

Poets have compared a pretty face, dainty limbs and attractive eyes to the flower.

Tea is aromatized with lotus in all the traditional festivals of Vietnam. Egyptian steeped this plant in hot water and used it for treatment of cough and for reducing mucous secretion, and, in general, as sedative and cardio respiratory tonic. As the root abounds in alkaloids, has an stimulant action, specially in defenses mechanism.

COSMETIC PROPERTIES

The active principles flower contains are responsible for its cosmetic use. Lotus extract can be adapted for the formulation of any kind of cosmetic product with specific action on the skin and hair moisturizing and can be used all products wherever it acts as an anti-inflammatory element.

Flavonoids, the primary constituents of the petals of *Nelumbo nucifera*, are known to have antioxidant properties and antibacterial bioactivities.

Antioxidant activity

This activity is mainly due to the flavonoids of Sacred Lotus flowers. The chemical criteria to establish the antioxidant ability of flavonoids are:

- Presence of an O-hydroxyl structure in the B ring, which confers higher stability to the radical form and participates in electron delocalization.
- A double bond, in conjugation with the 4-oxo functional group in the C ring
- 3- and 5-OH groups with 4-oxo function in the A and C rings necessary to reach the maximum antioxidant power

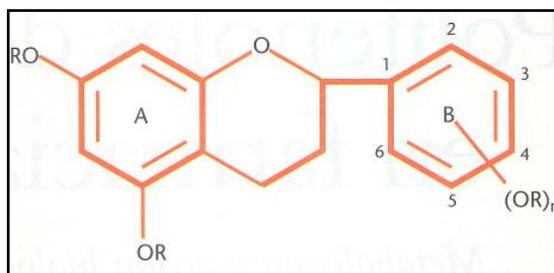


Fig.1. General structure of flavonoids.

The antioxidant activity of flavonoids results from the combination of their iron chelating activity and their ability to scavenge aging-inducing free radicals (FR). Flavonoids can inhibit oxidases such as lipooxygenase (LO), cyclooxygenase (CO), mieloperoxidase (MPO), NADPH oxidase and xanthine

oxidase (XO), thus preventing the *in vivo* formation of reactive oxygen species (ROS) and organic hydroperoxide. Additionally, it has been found that flavonoids inhibit enzymes indirectly involved in oxidative processes, such as phospholipase A2 (PLA2), and stimulate other enzymes with well-known antioxidant properties, such as catalase (CAT) and superoxide dismutase (SOD). Through these mechanisms, flavonoids interfere the propagation reactions of free radicals and affect their very formation (Pérez Trueba G., 2003).



Besides scavenging free radicals, chelating metal ions and inhibiting oxidase enzymes, flavonoids may increase the availability of endogenous antioxidants and the activity of antioxidant enzymes.

Additionally, they inhibit enzymes involved in the formation of ROS (Pérez Trueba G., 2003).

In a study conducted by Jung in 2003, the antioxidant activity of *Nelumbo nucifera* stamens was evaluated for their potential to scavenge stable 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radicals, inhibit total reactive oxygen species (ROS) generation and scavenge peroxynitrites (ONOO-).

A methanol (MeOH) extract of the stamens of *N.nucifera* showed strong antioxidant activity in the ONOO- system, and marginal activity in the DPPH and total ROS systems, so were therefore fractionated with several organic solvents, such as dichloromethane, ethyl acetate and n-butanol. The acetate soluble fraction exhibited strong antioxidant activity in all the model systems tested (Jung, 2003).

Thus, sacred lotus extract is recommended to formulate products to protect hair and skin from oxidative damages.

Cell regeneration stimulating activity

This activity is due to the carbohydrates content of sacred lotus flower extract. These are compounds of the oligosaccharide type that act by activating the non-specific immune system. They activate the Langerhans cells at the dermal level and consequently, boost the production of cytokines. Cytokines first act by eliminating rests of dead cells or substances foreign to the organism and subsequently activating cell regeneration factors that repair the vascular system with the consequent oxygen supply to the tissues. Then, they activate factors involved in the synthesis of collagen and elastin. Consequently, cell regeneration, and hence stimulation of this system, takes place, thus resulting in an anti-ageing action. Because of such cell regeneration, they are also useful for anti-acne and anti-irritant treatments.

Thus, sacred lotus flower extract is recommended in regenerating, moisturizing and emollient cosmetic formulations.



Body sculpture activity

Catechins can reduce body fat in humans. Thus, Nagao et al. in 2005 investigated the effect of catechins on body fat reduction and the relation between oxidized LDL and body fat variables. A 12-wk study was performed in which the subjects ingested 1 bottle oolong tea/d containing 690 mg catechins (active extract group) or 1 bottle oolong tea/d containing 22 mg catechins (control group).

Body weight, BMI, waist circumference, body fat mass, and subcutaneous fat area were significantly lower in the active extract group than in the control group. Changes in the concentrations of malondialdehyde-modified LDL were positively associated with changes in body fat mass and total fat area in the active extract group.

Thus, sacred lotus extract is recommended to formulate cosmetic products with body sculpture activity, such as anti-cellulite treatments or body firming products.

Blood circulation stimulatory activity

The main activity attributed to flavonoids is to act as vein-active agents, since they reduce the permeability and increase the resistance of blood capillaries. Flavonoids are used in the treatment of blood-vessels disorders such as varicose veins, chronic venous insufficiency (CVI), low capillary resistance, etc. Their protective effect is due to their high affinity for proline-rich proteins, such as collagen and elastin. These proteins are structural components of veins, thus their degradation weakens blood vessels, inducing edema and swelling of the lower limbs. Oral administration of flavonoids has been observed to effectively improve capillary resistance in animal models. (Bruneton, J., 2001).

Thus, sacred lotus extract is of great use to formulate cosmetic products with blood circulation stimulating properties.

COSMETIC APPLICATIONS

Action	Active	Cosmetic Application
Anti-oxidant	Flavonoids	Anti-ageing Hair colour protection Photo-protection
Stimulation of cell regeneration	Carbohydrates	Anti-ageing Anti-acne/anti-irritation treatments
Body sculpture	Catechins	Anti-cellulite Firming
Blood flow activator	Flavonoids	Stimulant of blood circulation

RECOMMENDED DOSAGE

Recommended dose is between 2% - 5%.

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