

Glycyrrhiza glabra

Licorice



With a constituent – glycyrrhizic acid – that is 50 times sweeter than sugar, most people have come to associate *Glycyrrhiza glabra* as a sweet-tasting ingredient in candy. However it is also a very powerful herb in treating many different illnesses, especially inflammatory conditions of the respiratory and digestive tract. Its long history of use and plethora of actions has traversed geographical boundaries, claiming a prime spot in both Western and Oriental herbal dispensaries.

Botanical Name: *Glycyrrhiza glabra*

The genus name "*Glycyrrhiza*" was given by the first century physician, Dioscorides, by putting "glukos" (sweet) and "riza" (root) together.

Family: Fabaceae

Common Name: Licorice

Synonyms: *Glycyrrhiza inflata*, *Glycyrrhiza uralensis*, *Liquiritia officinalis* (botanical synonyms), liquorice, sweet root (English), Liquiritiae radix, Radix glycyrrhizae (Latin), Sußholzwurzel, Lakritzenwurzel (German), réglisse, bois doux (French), liquorizia (Italian), Lakrids (Danish), yashimadhu (Sanskrit), gancao (Chinese), kanzo (Japanese), kamcho (Korean). (Mills et al 2000)

Parts Used: Root and stolons, dried (Hoffman 2000, McIntyre 1994, Mills 1991)

Description:

Glycyrrhiza is a tall, erect perennial herb with branched stalks that grow to 1.5 metres. The stalks are round at the base and angular at the top. It is deep-rooted, with the root system consisting of a stout rootstock dividing into a mixture of taproots, long branch roots and stolons, which can grow to 2 metres or more. The strong woody rootstock is about 1 cm thick, brown on the external surface and yellow internally. It has a characteristic sweetish taste. (Fletcher 1991, Mills 1991, Weiss et al 2000)

Leaves: The branches bear three to seven pairs of opposite, short-stalked, even pinnate leaves with a single leaf at the tip. The dark green elliptical shaped leaves are 2-5 cm in length, and half as wide. The upper surface of the leaves is smooth, and the lower surface is sticky. (Fletcher 1991, Mills 1991, Weiss et al 2000)

Flowers: From the axils of the leaves grow long-stemmed clusters of bluish-purple butterfly shaped flowers with a white tip. The calyx is bilabiate; both cusps of the upper lip are fused and the three tips of the lower lip are free. (Fletcher 1991, Mills 1991, Weiss et al 2000)

Fruits: Small smooth-skinned leguminous seedpods, which are 2-2.5 cm long. They each contain three or four seeds. (Fletcher 1991, Mills 1991)

Distribution and Cultivation:

Glycyrrhiza is a native of south-east Europe and south-west Asia, which includes Iran. It grows in open fields and moorlands, thriving near running water. It now grows abundantly throughout northern China, Siberia, Mongolia and central Asia, and is also extensively cultivated. *Glycyrrhiza* can be grown from seeds but is usually propagated by dividing the roots and replanting them immediately in autumn or storing them in sand until spring. *Glycyrrhiza* is a temperate-zone herb but will also grow successfully in sub-tropical regions. The roots of 3-4 year old plants are harvested in late autumn. (Chevallier 2001, Fletcher 1991, Mills 1991)

History of Use:

Glycyrrhiza is among the world's most ancient herbal remedies. It was used in Ayurvedic medicine more than 4000 years ago in India. A large amount of this herb was also discovered during an excavation of a famous pharaoh's tomb in Egypt in 1923. The Tang dynasty Chinese physician Sun Ssu-mo also noted *Glycyrrhiza*'s potent antidote properties 1400 years ago in his classic health volumes *Precious Recipes*, in which he states, "the detoxifying power of licorice when it meets poisons in the human body can be compared to the melting power of a pan of boiling hot water when poured onto snow on the ground." (Reid 2001) The ancient Greek and Assyrian physicians also ground the roots into a paste or powder form to treat wounds, mouth ulcers, asthma, coughs, respiratory troubles, swellings, excessive salivation and fluid retention. When it was later introduced into other parts of Europe, it continued being used in the same way. (Fletcher 1991)

Culpeper recommended boiling *Glycyrrhiza* roots in water with some Maidenhead and figs to make a drink for a dry cough or hoarseness, wheezing or shortness of breath, and for chest and lung pains. He also states that the juice is also effective in treating chest and lung diseases. For children, he advocated a strong decoction of the root to loosen bowels and to allay feverish heats. (Potterton 1996) Writing in 1930 in her herbal, Grieve noted its use as a demulcent, pectoral and emollient. She states that it was a popular and well-known remedy for coughs, consumption (tuberculosis) and chest problems, especially bronchitis. Due to its soothing effect, it was an ingredient that could be found in almost all the popular cough medicines at that time. Together with sedatives and expectorants, *Glycyrrhiza* was also used in the production of cough lozenges and pastilles. It was commonly used with a linseed infusion to treat irritable coughs, sore throats and laryngitis. (Grieve 1931)

Chemistry/Active Constituents:

- ☞ Triterpenoid saponins: Glycyrrhizin, present in the form of calcium and potassium salts, 2-15%
Also known as Glycyrrhizic acid.
- ☞ Glycyrrhetic acid (18-beta-glycyrrhetic acid, GA), 0.5-0.9%
- ☞ Flavonoids: liquiritoside, isoliquiritoside
- ☞ Bitter principle: glycymarin
- ☞ Steroid hormones: includes oestrogenic substances
- ☞ Resinous oil 15%
- ☞ Starch 20%
- ☞ Saccharose 3%
- ☞ Glucose 3%
- ☞ Asparagin 2-6%
- ☞ Mannitol
- ☞ Atropin, Coumarins
- ☞ Choline, Betaine
- ☞ Progesterone-related substances
- ☞ Steroids analogous to ACTH
- ☞ Tannins (Mills 1991, Mills et al 2000, Schulz et al 2001, Weiss et al 2000)



* The *European Pharmacopoeia* proposes that *Glycyrrhiza glabra* should contain at least 4% Glycyrrhizin. Glycyrrhizin is weight for weight 50 times sweeter than sucrose, thus accounting for its widespread use as a flavour-corrective in medications that contain bad-tasting or nausea-inducing drug substances. (Mills et al 2000)

Mode of Action:

Central to the activity of this herb is the presence of glycyrrhizin, which is believed to be responsible for the plant's function in the respiratory system, acting as an expectorant and helping to prevent and ease coughing. This ingredient and its derivatives work as an anti-inflammatory. It is also largely the glycyrrhizin, which gives an anti-allergenic effect, especially when treating asthma.

Anti-inflammatory and Anti-Allergic Activity

In the human body, glycyrrhizin is hydrolysed to glycyrrhetic acid, which has a triterpenoid structure that is similar to the hormones of the adrenal cortex. Recently, research has shown that glycyrrhetic acid inhibits the enzyme 11-beta-hydroxy steroid dehydrogenase, which is responsible for converting cortisol, the active form into its inactive metabolites. Thus inhibition of the enzyme by glycyrrhetic acid significantly increases the levels of cortisol and also stimulation of the glucocorticoid receptors. This in turn potentiates the action of hydrocortisone, the main glucocorticoid secreted by the adrenal cortex. Hydrocortisone is associated with, and accounts for glycyrrhizin and glycyrrhetic acid's anti-inflammatory, anti-allergic and anti-arthritic effects, and also its role in stimulating the adrenal cortex after steroid therapy. Moreover, while its actions resemble those of cortisol and hydrocortisone, *Glycyrrhiza* does not cause ulcers in the digestive tract or suppress the production of blood cells like standard steroid therapy does. (Chopra et al 2000, Mills 1991, Mills et al 2000, Murray in Miller et al 1998, Weiss et al 2000)



Other possible mechanisms have been proposed to be responsible for the anti-inflammatory activity. Separate vitro studies have shown that glycyrrhizin is a thrombin inhibitor, and that it inhibits the production of reactive oxygen species by neutrophils. Glycyrrhizin has also been shown to inhibit phospholipase A₂. In doing so, it inhibits the conversion of phospholipids to arachidonic acid which in turn inhibits the formation of leukotrienes, which are derived from arachidonic acid. Leukotrienes are very potent bronchoconstricting agents; by limiting their synthesis, *Glycyrrhiza* has been shown to reduce hypersensitive reactions in asthmatics. (Mills et al 2000, Myers 1987)

However, inhibiting the metabolism of corticosteroids also results in greater stimulation of the mineralocorticoid effect in the kidney. Glycyrrhetic acid also potentiates ACTH activity by causing aldosterone-like kidney retention of sodium and water, and consequently hypokalaemia, raised blood pressure, oedema and decreased haemoglobin levels. (Mills 1991, Mills et al 2000, Murray in Miller et al 1998, Weiss et al 2000)

Antiviral and Anti-microbial Activity

Glycyrrhizin has been shown to stop the growth of many bacteria and viruses including influenza A. It inhibits virus growth and inactivates virus particles. It is especially active against the herpes simplex virus, varicella-zoster virus, human herpes virus and human immunodeficiency virus. In vivo studies have found that it induces interferon production and is able to promote the activity of key immune cells. (Chopra et al 2000, Mills et al 2000)

In one research, the antibacterial activity of compounds obtained from *Glycyrrhiza* was measured against upper airway respiratory tract bacteria such as *Streptococcus pyogenes*, *Haemophilus influenzae* and *Moraxella catarrhalis*. Among the tested compounds, licoricidin exhibited the highest activity against all tested microorganisms. Three coumarin derivatives, glycyrol, glycyrin and glycycomarin also showed antibacterial activity. (Tanaka et al 2001)

In vitro studies also showed that isoflavonoids isolated from *Glycyrrhiza* exhibit considerable antimicrobial activity. Licochalcone A stopped the growth of both chloroquine-susceptible and chloroquine-resistant *Plasmodium falciparum* strains. Oral administration to mice also protected them from *Plasmodium yoelii* infection. In addition, Licochalcone A also inhibited the growth of *Leishmania major* and *L. donovani* promastigotes and amastigotes. (Mills et al 2000)

Spasmolytic Activity

Liquiritin present in the roots of *Glycyrrhiza* is inactive as an anti-spasmodic. However when hydrolysed by heat and converted to isoliquiritigenin, it was shown to exhibit strong spasmolytic activity. (Mills et al 2000)

Anti-pyretic Activity

Glycyrrhiza's anti-pyretic activity is due to glycyrrhetic acid's aspirin-like effects.

Expectorant Activity

While the specific mechanism of action remains unknown, *Glycyrrhiza* has been shown to work as effectively as codeine in the throat, decreasing irritations and producing expectorant effects. One proposed explanation is that in the same way that carbenoxolone, a semisynthetic compound derived from *Glycyrrhiza*, is able to stimulate gastric mucus secretion, it is also able to stimulate tracheal mucus secretions and hence produce demulcent and expectorant effects. (Murray in Miller et al 1998, PS)

Actions:

- ☞ Anti-inflammatory
- ☞ Anti-pyretic
- ☞ Expectorant
- ☞ Demulcent
- ☞ Antitussive
- ☞ Spasmolytic
- ☞ Anti-allergic
- ☞ Antibacterial
- ☞ Antiviral
- ☞ Adrenal tonic
- ☞ Adaptogen
- ☞ Hepatoprotective
- ☞ Nutritive
- ☞ Oestrogenic
- ☞ Emollient
- ☞ Diuretic
- ☞ Mild laxative
- ☞ In TCM: Tones the spleen and stomach energy, quells heart fire, tones Triple Burner and primordial energy, scatters external cold

(Chevallier 2001, Hoffman 2000, McIntyre 1994, PS, Reid 2001)





Indications for Use:

Glycyrrhiza is commonly used in respiratory problems such as catarrh, bronchitis and coughs, asthma and other chest infections. It reduces throat irritation and also produces an expectorant action. Its hydrocortisone-like effects have even seen its use as a healing agent for tuberculosis. Due to glycyrrhetic acid's aspirin-like effect, *Glycyrrhiza* is also effective in helping to reduce fevers and soothe pain in headaches. In addition, its anti-allergenic effect helps to counter the signs and symptoms of hay fever, allergic rhinitis, conjunctivitis and bronchial asthma. (Murray in Miller et al 1998)

Apart from the respiratory system, glycyrrhizin's hormone-like structure accounts for *Glycyrrhiza's* affinity for the endocrine system. In addition to its anti-inflammatory, anti-allergic and anti-arthritis properties, the steroid-like compounds in *Glycyrrhiza* can convert to oestrogen precursors oestradiol and oestrone, giving the herb mild estrogenic properties. This property has been used in the treatment of menopause. Its hormone-like activity also makes *Glycyrrhiza* a suitable alternative for those who are trying to wean themselves off orthodox steroid drugs. (Mills 1991, Mills et al 2000, Murray in Miller et al 1998, Weiss et al 2000)

Another well-documented use of *Glycyrrhiza* is in the treatment of gastric and duodenal ulcers. As mentioned, carbenoxolone promotes gastric mucous secretions. It increases the longevity of gastric epithelial cells, and promotes cell proliferation in the stomach, thus allowing ulcers to heal. *Glycyrrhiza* also lowers stomach acid levels. *Glycyrrhiza* can be used to relieve heartburn, indigestion, irritation, inflammation and spasm in the digestive tract. It is also suggested that *Glycyrrhiza* has the ability to promote detoxification of drugs in the liver and neutralisation of many toxins like diphtheria and tetanus. Through its beneficial action on the liver, it increases bile flow and lowers cholesterol levels. (Mills 1991, Mills et al 2000, Murray in Miller et al 1998, Weiss et al 2000)

Based on its action on the adrenal glands, *Glycyrrhiza* is also thought to improve resistance to stress, and should be considered during periods of physical and emotional stress, after surgery or during convalescence, or when fatigued and run down. (McIntyre 1994)

Indications:

Respiratory:

- ☞ Bronchial catarrh
- ☞ Bronchitis
- ☞ Coughs
- ☞ Chest complaints
- ☞ Asthma
- ☞ Sore throats
- ☞ Laryngitis
- ☞ Emphysema
- ☞ Bronchiectasis
- ☞ Hay fever
- ☞ Allergic rhinitis
- ☞ Bronchial asthma
- ☞ Colds
- ☞ Fevers

Others:

- ☞ Conjunctivitis
- ☞ PMS (but not with bloating)
- ☞ Menopause
- ☞ Herpes simplex
- ☞ Indigestion
- ☞ Irritable bowel syndrome
- ☞ Colic
- ☞ Chronic gastritis
- ☞ Peptic/Gastric/Duodenal ulcers
- ☞ Hepatitis
- ☞ Cirrhosis
- ☞ Rheumatoid arthritis
- ☞ Stress
- ☞ Fatigue
- ☞ Primary adrenocortical insufficiency

- ☞ BHP: - Gastric or Duodenal Ulcers
- Addison's disease.
- ☞ German Commission E: - Catarrh of the upper respiratory tract
- Gastric or Duodenal Ulcers

(Chevallier 2001, Fletcher 1991, Hoffman 2000, Holmes 1993, McIntyre 1994, Reid 2001)

Contraindications/Precautions:

- ☞ On prolonged use and with higher doses, mineralocorticoid effects may occur in the form of sodium and water retention and potassium loss, accompanied by hypertension, oedema, and hypokalaemia, and, in rare cases, myoglobinuria.
- ☞ The German Commission E lists cholestatic liver disorders, liver cirrhosis, hypertension, hypokalaemia, severe kidney insufficiency and pregnancy as contraindications. It is also contraindicated in oedema and congestive heart failure.
- ☞ 30-40g per day for nine months has been shown to cause muscle weakness, lethargy and dulled reflexes.
- ☞ Due to action on aldosterone, people on *Glycyrrhiza* should be on a low sodium high potassium diet.
- ☞ Potassium loss due to other drugs, like thiazide diuretics, can be increased. Thus they should not be taken together with glycyrrhizin.
- ☞ With potassium loss, sensitivity to digitalis glycosides increases. Thus *Glycyrrhiza* should not be used by people taking the prescription drug digoxin.
- ☞ *Glycyrrhiza* may interfere with the oral contraceptive pill due to its amphoteric oestrogenic effects.
- ☞ The German Commission E Monographs recommends using *Glycyrrhiza* in therapeutic doses for no longer than 4-6 weeks without medical advice. There is no objection to using it as a flavouring agent up to a maximum daily dosage equivalent to 100 mg glycyrrhizin.
(Chopra et al 2000, Fletcher 1991, Hoffman 2000, Mills et al 2000, Murray in Miller et al 1998)

Posology:

Decoction: ½-1 teaspoon root in 1 cup water. Bring to a boil and simmer 10-15 minutes. Drink 3 tds.
Tincture: 1-3 ml tds (Hoffman 2000)

Herbal Combinations:

Asthma

Formula: 4 parts *Grindelia camporum*, 1 part *Lobelia inflata*, 1 part *Prunus serotina*, 1 part *Glycyrrhiza glabra*, 1 part *Leonurus cardiaca*, 1 part *Ephedra sinica*. Make up as a tincture.

Dosage: 5ml 3 times a day. (Hoffman 2000)

Flu

Formula: 2 tsp *Achillea millefolium*, 2 tsp *Filipendula ulmaria*, 2 tsp *Hypericum perforatum*, 2 tsp *Schisandra chinensis*, 2 tsp *Usnea barbata*, 1 tsp *Angelica archangelica*, 1 tsp *Glycyrrhiza glabra*.

Dosage: Take a dropperful in half a cup of hot water 3-5 times a day. (Mars 1997)

Hayfever and Allergies tea

Formula: 1 tsp *Urtica dioica*, ½ tsp *Euphrasia officinalis*, ½ tsp *Echinacea spp.*, ½ tsp *Glycyrrhiza glabra* root powder, 2 *Zizyphus jujuba* dates.

Pour 2 cups boiling water over the herbs. Steep for 15-20 minutes. Strain.

Dosage: Drink 3-4 cups a day. (Mars 1997)

Antitussive tea according to German Standard Registration

Formula: 5 parts *Althaea officinalis* root, 2 parts *Foeniculum vulgare* seeds, 2 parts *Cetraria islandica*, 3 parts *Plantago lanceolata*, 2 parts *Glycyrrhiza glabra*, 6 parts *Thymus vulgaris*.

Pour 150ml boiling water over 1 tablespoon of tea. Steep for about 10 minutes. Strain.

Dosage: Drink several cups throughout the day. (Schulz et al 2001)

Chest tea according to German Pharmacopeia

Formula: 8 parts *Althaea officinalis* root, 4 parts *Althaea officinalis* leaves, 3 parts *Glycyrrhiza glabra*, 2 parts *Verbascum thapsus*, 1 part *Viola odorata*, 2 parts *Pimpinella anisum*.

Pour 150ml boiling water over 1 tablespoon of tea. Steep for about 10 minutes. Strain.

Dosage: Drink several cups throughout the day. (Schulz et al 2001)

Cough and Bronchial tea according to German Standard Registration

Formula: 1 part *Althaea officinalis* leaves, 2 parts *Foeniculum vulgare* seeds, 5 parts *Plantago lanceolata*, 5 parts *Glycyrrhiza glabra*, 4 parts *Thymus vulgaris*, 1 part *Centaurea cyanus*, 1 part *Primula vulgaris*, 1 part *Althaea officinalis* flowers.

Pour 150ml boiling water over 1 tablespoon of tea. Steep for about 10 minutes. Strain.

Dosage: Drink several cups throughout the day. (Schulz et al 2001)



Energetic and Spiritual Properties:

Glycyrrhiza promotes the rejuvenation of expressive freedom. Long connected with love, and with both lust and fidelity, it has an estrogenic and steroidal action. (Cruden 1997) *Glycyrrhiza* helps to break down blockages in understanding one's purpose or understanding another person, thus promoting interpersonal relationships. Typical users of *Glycyrrhiza* are those who are more aligned with their spiritual purpose, as a complete awareness and use of emotions is not easily accessible to those who are not. Emotions are energy; with the use of *Glycyrrhiza*, one understands that energy is a manifestation of God in oneself. Once that is

acknowledged, emotions that may otherwise hinder the growth of psychic abilities are brought to the surface to be worked with and released. *Glycyrrhiza* thus helps to enhance deeper states of emotional release in a person, bringing forth spiritual development.

The sweetness and stimulating ability of its taste acts as its signature, promoting salivation in the mouth and activating enthusiasm, urgency and other strong emotions. It is no coincidence that *Glycyrrhiza* is a popular flavour for sweets and other condiments. The karmic purpose of *Glycyrrhiza* is to stimulate the formation of emotions on the etheric level for mankind, and for mankind to choose it. Having worked through the emotional level, *Glycyrrhiza* should be seen by spiritual aspirants as a taste that is too stimulating and thus they do not desire it anymore. At such a time, they will know that *Glycyrrhiza* has served its purpose. (Gurudas 1988)

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