

Sumacs:

The Turkish Tang

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Sumac (Common sumac, culinary sumac)
-*Rhus coriaria* L. (Anacardiaceae)

Common names: Sumac, common sumac, culinary sumac, spice sumac, Sicilian sumac, tanner's sumac, tanning sumac.

Regional /vernacular names: **Arabic:** simmeck (liban), sumāq, summaq; **Chinese:** lán fū mù, lán fū mù, lán fū mù; **Danish:** garve-sumak; **Dutch:** sumak, zuurkruid; **Finnish:** sumakki; **French:** corroyère, sumac des corroyeurs, sumac des épiciers; **German:** essigbaum, färberbaum, gerber-sumach, gerbersumach, gewürzsumach, sumach; **Hindi:** kankrasing; **Italian:** sommaco, sommacco, sommacco siciliano; **Japanese:** sūmakku, sūmakku; **Persian:** somagh; **Portuguese:** arbore das pelucas, sumagre; **Russian:** cymax sumakh dubil'nyy, sumakh krasil'nyy, cymax sumakh kozhevennyj; **Spanish:** adurión, aldebajín, palillo, piñas, sumac, sumagre, sus, tano, de tenería, zumaquera; **Swedish:** bärsumak, siciliansk sumac.

Sumac is a popular spice of the Middle East and Persian Gulf countries and is used widely

A portion of the fruit bunch with ripe red fruits

with rice, vegetables, meat dishes and desserts. From the Arab countries, the use of sumac has spread among the culinary experts in continental Europe and America and also to other countries. The term sumac is derived from the Arabic root *summaq*, meaning red, referring to the colour of the ripe and dry sumac fruit. Though sumac is derived from the species *Rhus coriaria*, many other species of *Rhus*, known by related names are used as spice in local culinary art. Among the many sumacs, the most commonly used and the most important is *Rhus coriaria*, the Sicilian sumac, common sumac or culinary sumac. Other species used include Chinese sumac (*Rhus sinensis*), smooth sumac (*Rhus glabra*), Staghorn sumac (*Rhus hirta*), fragrant or sweet sumac (*Rhus aromatica*), lemonade sumac (*Rhus integrifolia*), sugar sumac (*Rhus ovata*) and Mullers'sumac (*Rhus mulleria*).

The history of sumac use goes back to many centuries. It was popular from the Mediterranean to the present day Iran and is still a unique

spice popular in these regions. It is important from an industrial point of view as the plant contains colouring matter and tannins that are used in dyeing and tanning. This dye is useful in colouring silk, goat wool, Angora rabbit wool and sheep wool as the colour is stable. Leaves and fruits are the most useful plant parts.

Sumac trees grow wild in Mediterranean region, Western Asia, parts of Arabia and Central Asia. Several species of the genus *Rhus* grow around the Mediterranean region. This region is also considered the original home of the common sumac. Many members of this genus are in general mildly to severely toxic, only a few like the common sumac are relatively harmless. Smooth sumac, sweet sumac and staghorn sumac are found distributed in many places in USA, Canada and Central America.

The Plant

Sumac is a small tree or a large deciduous shrub reaching about 3-5 m in height. Leaves



One ripe fruit bunch (infructescence)

basifixed, ovoid-oblong, or ellipsoid. Female panicles are 5-25 cm long and 3-6 cm broad. Female flowers have 5 sepals, 5 petals and a superior ovary with a single ovule, ovoid or ovoid-globular and densely hairy; style is short and has 3 stigmas. Fruits grow in bunches of globular drupes, slightly compressed, and turn red or reddish brown on maturity, with glandular pubescence. Exocarp and mesocarp are united with mesocarp glutinous and red.

Sumac is pollinated by bees. They can be easily propagated through seeds or through stem and root cuttings. Because of the abundant seed production and wide adaptability, they often assume the status of weeds in many localities in USA. Only the common sumac or Sicilian sumac is cultivated for its fruits and leaves.

Chemical Composition

The common phytochemical constituents of sumacs present in fruit pericarp, leaves and bark are volatile oil compounds, the industrially useful tannins, flavonoids, sesquiterpenoids, steroids, anthocyanins, phenolic acids, xanthon and various miscellaneous substances. About 60 compounds have been identified in the essential oil extracted through hydrodistillation of leaf, 63 in the essential oil from bark/ branch and 85 in the essential oil from fruit pericarp.

The essential oil extracted from the fruits contains mainly terpene hydrocarbons (like α -pinene, β -caryophyllene and cembrene) and oxygenated terpenes (like α -terpineol, carvacrol and β -caryophyllene alcohol). Fruit pericarp contains phenolic derivatives known as xanthones. Plant steroids β -sitosterol-beta-D-glucoside are also isolated from the seeds.

Tannins present in sumac fruits are hydrolysable, susceptible to cleavage by hydrolysis and have small molecular size. Their small size makes them easier to digest and absorb; they have many health benefits too. Tannins of leaves and stem are commercially extracted for use

in leather tanning. HPLC analysis of aqueous extract led to the characterization of penta-, hexa-, hepta-, octa-, nona-, deca-, undeca- and dodecagalloyl glucose derivatives.

Flavonoids present in sumac are mainly myricetin, quercetin and kaempferol. Sumac fruits contain a fixed oil that is edible. This oil yields mainly oleic, linoleic, palmitic and stearic acids. Other phenolic and fatty acids present are: malic acid, azelaic acid, tetradecanoic acid, 7-hexadecenoic acid, ethyl octadecenoate, elaidic acid, 11,13-eicosadienoic acid, 11-eicosenoic acid, arachidic acid, behenic acid and tetracosanoic acid. Many other phytochemicals have also been isolated and identified in sumacs.

Sicilian sumac is a culinary spice. Its flavour characteristics are described as 'oil and acid aroma, dried lemon balm, cellulose / woody, spicy, earthy and astringent.' The astringent acidic flavour is mostly due to two types of compounds, tannins (about 4% as gallotannins) and organic acids (malic, citric and tartaric acids along with smaller amounts of succinic, maleic, fumaric and ascorbic acids). Sensory analysis indicated that the malic acid present in the fruit is mainly responsible for the sour taste. Beta-caryophyllene contributes both the spicy and woody flavour; cembrine the woody flavour and caryophyllene oxide the spicy flavor.

Sumac plant parts including fruits contain a toxic chemical compound by the name, urushiols (3-alkyl pyrocatechol derivatives), which are powerful allergens causing painful dermatitis in sensitive people and this allergen is effective in sub-microgram quantities.

Functional Properties

Sumac extract exhibits antioxidant, bactericidal and hypoglycemic effects. It markedly protects the hepatocytes against, glutathione depletion, lysosomal membrane oxidative damage, ROS generation, lipid peroxidation, cellular

proteolysis and mitochondrial membrane potential decrease. Gallic acid, one of the chief constituents of the plant, also shows similar kind of protection. Sumac extract exhibits synergistic interaction with antimicrobial drug. Activity guided fractionation of smooth sumac extract leads to the identification of the anti-bacterial compounds as: the methyl ester of 3,4,5-trihydroxybenzoic acid (methyl gallate) (minimal inhibition concentration (MIC) 12.5 micrograms/ml); 4-methoxy-3,5-dihydroxybenzoic acid (MIC 25 micrograms/ml) and gallic acid (MIC > 1000 micrograms/ml). Methanol extract of sumac fruit gives 48.3% inhibition of α -amylase activity, while ethyl acetate and hexane fractions gives 91.9 and 44% inhibition respectively at a concentration of 100 μ g/ml. Ethanolic extract shows significant hypoglycemic activity in animal tests with induces diabetes. In long term test, 26% decrease in blood glucose level was noticed on 21st day. In oral glucose test, significant reduction in blood glucose level was achieved with the administration of sumac fruit extract.

Uses

Medicinal uses

Sumac is astringent, diuretic, styptic and tonic and according to Duke (2002) it is indicated in the following conditions: bacterial infection, biliousness, candidiasis, cholera, diarrhoea, dysentery, dyspepsia, gastrosis, gingivitis, hemoptysis, hepatitis, inflammation, leucorrhoea, ophthalmia, sores, stomachache, ulcer, viral infections and vomiting. It is used medicinally in Unani medicine and is used popularly in the Arab world. Information available on its medicinal properties indicates that sumac can be a source of phytomedicines with activities such as anti-fibrogenic, anti-fungal, anti-inflammatory, anti-malarial, anti-thrombin, anti-tumourigenic, anti-viral anti-glycemic and leukopenic actions. In the Indian Materia Medica sumac is indicated as a powerful

astringent, styptic, tonic and diuretic, also useful in dysentery. It checks bilious diarrhea, allays vomiting, and haemoptysis and is useful in checking leucorrhoea and diuresis. It is generally used in the form of a powder or extract. Fruit infusion is used as a gargle for catarrhal affections of the pharynx. Sumac powder mixed with charcoal powder is used as a wound healing mixture and used in dressing ulcers. Bark and leaves are used medicinally by the South American natives for many ailments. They use sumac fruits as diuretic, emetic, emmenagogue, purgative and refrigerant. Fruit is chewed to stop bed wetting.

Culinary uses

Sumac is a widely used spice throughout the Middle East and its use has spread to the Eastern and Western Europe as a result of the spread of Iranian and Turkish cuisines to the rest of the continent. Often sumac powder is also used as a condiment, it is provided on the dining table, to be sprinkled over food items before consumption. It is often put in the shakers or kept in bowls in kebab houses and is used like salt and pepper are used in the west. A dash of sumac powder improves the overall flavour and acceptability of many dishes, including fish, meat, vegetables rice and salads. It is used in sauces, soups, stews and combined with onion and salt and is a seasoning mix for roast meat. Immature fruits are used as a substitute for caper berries.

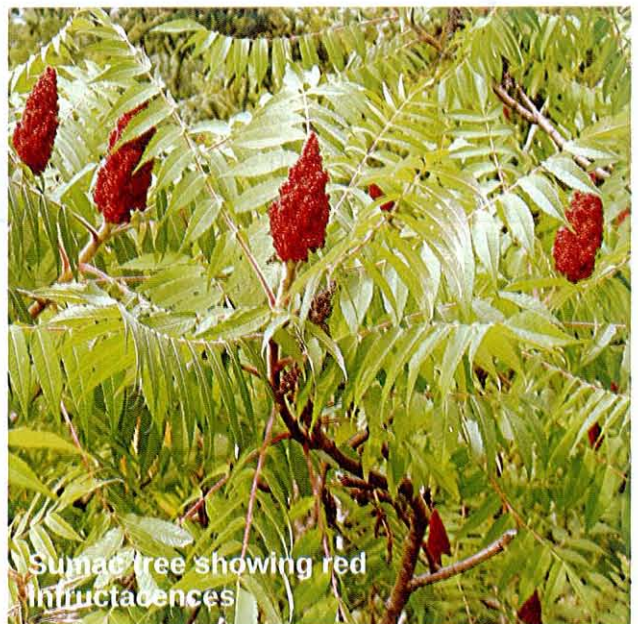


Separated seeds of sumac.

In Mediterranean countries, as well as in many Arab countries, sumac is mixed with sesame seeds, salt and thyme or hyssop in the popular spice mix called *za'atar* used as a seasoning for fried and barbequed meat or combined with olive oil for use as a dip for breads. In Egypt, sumac is used in another spice mix called *dukkah*. Sumac is a common rubbing spice, to be rubbed on meat, chicken or fish before frying or grilling. Sumac powder is added to marinades and is also used to increase the acidity of yogurt sauces (to which sumac also imparts an attractive colour) and vinaigrettes. Sumac enhances the flavour and taste of egg dishes and salads and it provides an attractive red colour. Because of this it is used as a decorative garnish on dishes such as hummus and other dips (Katzner, 2014).

There are many avenues in the culinary art of Asia where sumacs are made use of in a variety of ways, such as the following

1. Sumac in place of lemon juice in meat marinades: Not only does sumac give your marinades Middle Eastern flair, it also helps to protect the meat against spoilage due to its natural antibacterial properties. Another way to use ground sumac is to rub it directly into meats before grilling or frying.
2. Sumac can add a peculiar tangy flavor to salads as in *fattoush*, a Lebanese bread salad typically made from pieces of pita bread, mixed greens and other vegetables, and staghorn, sumac is typically added to the dish to give it a pleasantly sour flavor. It can be used in other salads as well— simply sprinkle some on top before serving or incorporate it into the salad dressing.
3. Use sumac to spice up roasted veggies; this spice adds colour and a lemony flavor to such dishes.
4. Sumac imparts a pleasant flavor and colour to various seafood dishes; in fact sumac has been singled out as the most essential spice for seafoods for imparting the special lemony flavor. It adds an attractive colour and also taste to such dips.
5. Sumac also functions as a condiment. It can be sprinkled over hummus and other dips just before their use.
6. Sumac is an excellent spice for flavouring bean dishes. It is combined with lentils, and nutty quinoa to create a filling salad, which is meal in itself. It can also be combined with various other peas and beans.
7. Sumac is an excellent spice for popcorns.
8. Finely ground sumac is said to be a very 'intriguing' spice for pastas. It can be added to spaghetti sauce or can be sprinkled over the finished dish (as a condiment).
9. It is an important component of the spice mix known as *za-atar* a very popular Middle Eastern seasoning blend. Za-atar is a spice mix powder made from sumac, thyme and sesame seeds in equal parts (with or without salt and oregano or majoram). This is used just like the sumac powder on top of flatbread, over roasted or grilled vegetables and meat or in dips.



Sumac tree showing red inflorescences

10. There are very many flat bread recipes in Lebanese and other Middle East cuisines where sumac or *za-atar* is used.

Ripe fruits of some sumacs [*Rhus glabra* smooth sumac, *Rhus hirta* (*Rhus typhina*) the staghorn sumac, *Rhus aromatica*, sweet sumac, *Rhus integrifolia*, lemonade sumac, *Rhus ovata*, the sugar sumac] are used in making refreshing lemonade like drink.

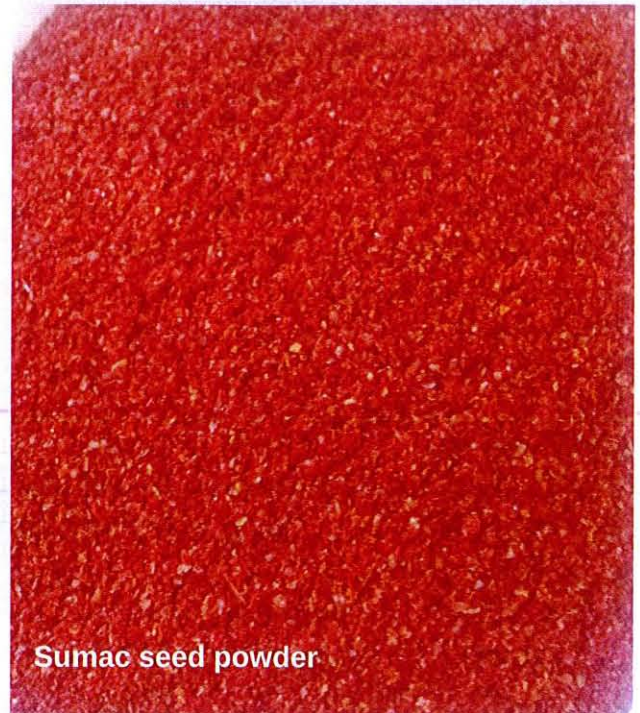
Examples of dishes using sumac are very many, it is especially popular in Central Asia and Mediterranean countries and is more popular with the Islamic cuisine. Many recipes are available in the public domains.

Other Uses

Leaves and bark are rich in tannin that is used in the tanning of leather. The classical Moroccan leather was prepared using the tannin from sumac. The finely ground leaves and stems provide the dyeing and tanning agent 'sumac'. Oil is extracted from the seeds, which gets solidified and is used in candle making. A black dye is obtained from the fruit and a yellow and a red dye are obtained from the bark.

Safety Issues

Culinary sumacs are relatively harmless and their fruits are safe. However there are related species (*Rhus* spp.) that are very toxic and highly allergenic. They are often known as poison sumacs. Once skin makes contact with poison sumac, urushiol, a compound present in the oil, penetrates the skin within a matter of minutes, says the American Academy of Dermatology. It takes longer for a rash to appear, usually one to three days. One may first notice itching, inflammation and redness before blisters erupt. These emerge wherever poison sumac touched the skin and may appear in streaks or lines. The more urushiol one comes into contact with, the worse one's symptoms will be. Widespread



Sumac seed powder

exposure may cause face, mouth, neck and genitals to swell and large clusters of oozing blisters form.

Exposure to *Rhus* urushiol causes skin lesions such as generalized maculopapular eruptions erythroderma, vesiculobullous lesions and erythema multiforme-like lesions. A study indicated that about 57% developed a leukocytosis with a neutrophilia (74%). In about 5% of patients, there were abnormalities of liver function. The reactions are due to the toxic effects of *Rhus* and not due to any immunological reactions. In another study of 31 patients with *Rhus* allergy, the clinical manifestation included maculopapular eruptions (65%), erythema multiformis (32%), erythroderma (19%), pustules, purpura, wheals and blisters. All the patients had generalized or localized pruritus and other symptoms including gastrointestinal problems (32%), fever (26%) chills and headache. Many developed a leukocytosis (70%) with neutrophilia (88%) and some had toxic effect on liver and kidneys. All patients responded to anti-histamine treatment.

