

REVIEW



Five Plants Used in the Traditional Asian Medicine, Their Functional Phytochemicals and Medicinal Properties

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The interest toward natural components in treatment and prevention of several diseases such as diabetes, cancer, coronary disease, arthritis, etc. have been increased in recent years. Common thistle is an annual/biennial broad-leaf weed which is rich in insulin, a starch which passes directly through the digestive system. Its root is diuretic, tonic, antiphlogistic, astringent and hepatic in traditional medicine as well as an important remedy for toothache. Ramsons is an erect perennial native to Eurasia and the most notable pharmacological benefits of ramsons are antibacterial activity, treats stomach problems, useful for chronic disease, many benefits for blood pressure and high cholesterol, appropriate for skin, suitable for inflammations and infections, aids in detoxification, ameliorate aggravations and allergies. The outstanding pharmacological benefits of lychee is helping to remove blemishes and reduce sunburns, to prevent signs of aging, promoting hair growth and providing a distinct shine, prevention of cataracts, anticancer effects, improve digestion, promoting cardiovascular health, regulating blood circulation, anti-influenza activity, anti-inflammatory activity, preventing blood vessel rupture, strengthening bones, increasing the libido and preventing anemia. The most notable health benefits of five flavor berries are increasing energy, anti-inflammatory activity, improving muscular activity, improving vision, increasing cellular health, and preventing liver disease, premature aging and protection against diabetes, radiation, and regulation of blood glucose levels, improve mental health, modulating blood pressure, improving digestion and preventing infection. Ajwain oil has a wide range of pharmaceutical applications such as antifungal, antibacterial, antioxidant, anti-inflammatory, antibacterial, nematocidal, stomachic, carminative, antiseptic, aromatic, digestive, antiseptic, and emmenagogue activities. The present review aims to present some of the most important pharmacological and health benefits five important medicinal plants in traditional Asian medicine which can be studied more due to their valuable chemical components to prevent and treatment of diseases.

Key words: Ajwain; Common Thistle; Five Flavor Berry; Lychee; Natural Products: Ramsons; Traditional Chinese Medicine

Herbs and their natural products are important sources of natural components with antitumoral, antibacterial, antioxidant, anti-diabetic activities which are used in traditional medicine (Shahrajabian and Sun, 2023a). Traditional Asian medicine has been used for thousands of years by different countries, cultures and generations to treat many diseases and to promote good health (Shahrajabian and Sun, 2023b). Herbal medicines and plants are medicinal products which contain variety of active components and pharmacologically plant ingredients (Sun *et al.*, 2022; Shahrajabian *et al.*, 2023; Shahrajabian and Sun, 2024). All thistles are annual to biennial in growth form and they reproduce merely by seed and are prolific seed producers. The common thistle (*Cirsium vulgare* L.) has a wide range medicinal characteristics, and can be used as survival food in needed. Ramsons, bear garlic or wild garlic (*Allium ursinum* L.) is possibly one of the most well-known wild leek species in Central Europe which grows in open forests with wonderful health benefits. Lychee (*Litchi chinensis* Sonn.) is one of the most important fruit in tropical and sub-tropical regions, which contains a wide range of chemical components such as sterols, flavonoids, triterpenes, phenolic and other bioactive components. Five flavor berry (*Schisandra chinensis*) is an ancient natural medicine in both traditional Chinese medicine and traditional Asian herbal sciences. In Chinese language, it is called wu wei zi as it has five tastes, namely sour, sweet, salty, bitter and astringent. It was abundant in orient with associated records traced back before Christ, and it was also first recorded in Shennong Bencao Jing. Ajwain is a highly valued medicinal plant which is an annual plant, belongs to the Apiaceae family. According to the Iranian traditional medicinal sciences, it is hot and dry which possess high contents of antioxidants, make it a probable natural source for developing nutraceuticals. The aim of this manuscript is to survey health benefits and pharmacological advantages of five important medicinal plant from traditional Asian medicinal sciences. In traditional Asian medicine, from traditional Chinese medicine to traditional Iranian and Indian medicine, balance between disease and health is a key

concept and vital factor to restore this balance and harmony as it has been said that to achieve balance, it is important to reach a balance between external elements such as metal, wood, water, fire, and earth with internal body organs, and both sides are important to be considered. Traditional medicinal and herbal products have found a variety of safety parameters with relatively few complications

Common thistle, Bull thistle, Spear thistle (*Cirsium vulgare* L.)

Common thistle, which is native to Eurasia, is known as one of the main prolific invasive species in the world, and it has been naturalized in many countries and spread to all over the world (Cripps *et al.*, 2020; Dan *et al.*, 2022; De *et al.*, 2022; Pawariya *et al.*, 2023; Pawariya *et al.*, 2024). It is a source of sesquiterpene lactones and neolignans (Solyomvary *et al.*, 2015; Roman *et al.*, 2021). Six phenolic acids such as protocatechuic, gallic, hydroxybenzoic, gentisic, caffeic, and vanillic acids were extracted in the fraction of free phenolic acids of the methanol extract of common thistle (Kozyra and Glowinski, 2013). Moreover, two main medicinal lignin components of fruits are the neolignan-type, the butyrolactone-type tracheloside and free balanophonin (Boldizsar *et al.*, 2012). Metabolic components from leaves and inflorescences of common thistle exerted a positive correlation between antioxidant activity and the total phenolic content for MeOH extracts and EtOAc fractions (Nazaruk, 2008). The antiproliferative assay of the components extracted from common thistle, confirmed a dose-dependent inhibitory impact of the structures of bearing the picrasmanolignans, balanophonin, desmethyl picrasmanolignans, and desmethyl balanophonin against SW480 colon cancer cells (Konye *et al.*, 2018).

Ramsons, Wild garlic (*Allium ursinum* L.)

It is a popular substitute and a traditional spice in many countries, which is a dominant herb layer species in nutrient rich, deciduous forests of Central Europe, and it relies on seeds for regeneration (Radulovic *et al.*, 2015; Tomsik *et al.*, 2017; Heinrichs *et al.*, 2018). It belongs to methiin/alliin-type *Allium* species, which contains mainly a mixture of (+)-S-allyl-L-cysteine-sulfoxide alliin and (+)-S-methyl-L-cysteine-sulfoxide

(methiin) (Tomsik *et al.*, 2016). It is an important source of both phenolic compounds and sulfur-containing substances (Gitin *et al.*, 2012), and its leaves include free forms of garlic, vanillic and ferulic acids, and bound forms of *p*-coumaric, and its bulbs contain free ferulic, *p*-hydroxybenzoic and vanillic acids, as well as bound forms of ferulic acids and *p*-coumaric (Durdevic *et al.*, 2004). Sulfur-containing components of wild garlic are accountable for its traditional application in terms of medicinal and culinary purposes, and the major cysteine sulfoxide were isoalliin and alliin (Schmitt *et al.* 2005). It has potential to reduce serum cholesterol levels primarily by inhibiting cholesterol synthesis, and its components showed nearly identical effectiveness to garlic extracts (Sendl *et al.* 1992). The main cysteine sulfoxides are isoalliin and alliin with different biological characteristics such as cytostatic, antimicrobial and antioxidant activities (Vlase *et al.*, 2013).

Lychee (*Litchi chinensis* Sonn.)

Lychee is a sub-tropical, delicious and juicy fruit which belongs to family Sapindaceae (Chen *et al.*, 2015). It occupies an important place and being cultivated in many countries such as the USA, China, Vietnam, India, Indonesia, Bangladesh, Thailand, Nepal, Philippines, South Africa, and etc. Its fruit is small, heart-shaped or spherical in shape, conical and bright red in color. Lychee fruits contains Oligonol, which a low molecular weight polyphenol which is considered to have tremendous anti-influenza and antioxidant properties (Sakurai *et al.*, 2008). It also contains strong preventative potential in Alzheimer and diabetes mellitus (Choi *et al.*, 2016). Lychee is also an important source of Vitamin C, B-complex vitamins such as niacin, thiamin, and folates (Rivera-Lopez *et al.*, 1999). The main volatile components in both lychee fruit and lychee juice are octanoic acid, hexanoic acid, isobutyric acid, decanoic acid, active amyl alcohol, isobutyl alcohol, 2-Phenylethyl alcohol, 1-Octanol, 1-Butanol, ethyl acetate, ethyl octanoate, ethyl hexanoate, ethyl dodecanoate, ethyl decanoate, isobutyl decanoate, isobutyl octanoate, isoamyl acetate, isoamyl octanoate, isoamyl hexanoate, isoamyl decanoate, citronellyl acetate, 2-Phenylethyl acetate, *cis*-Rose oxide, linalool, citronellol, and geraniol (Chen *et al.*, 2016). The most notable application of

lychee in traditional medicinal sciences is for cough, flatulence, stomach ulcers, diabetes, obesity and testicular swelling (Ibrahim and Mohamed, 2015). The lychee seed water extract has been proved to have significant effects in retarding lipid oxidation and inhibiting adipogenesis, which makes it the best choice to improve the quality and safety of meat products (Qi *et al.*, 2015). The seeds are basically discarded as waste except a small amount which is used as traditional medicine to treat testicular swelling and epigastric pain (Dong *et al.*, 2019). Oligonol could be suitable as future hypolipidemic and weight controlling parameters for obese and overweight females (Bahijri *et al.*, 2017).

Five Flavor Berry (*Schisandra chinensis*)

Polysaccharides and lignans are the main active chemical components of *Schisandra* (Yao *et al.*, 2014). Nine components were found from supercritical CO₂ extraction of *S. chinensis*, and their structures were recognized as schisandrin B, schisandrin C, schisandrin A, β -sitosterol, angeloyl-gomisin-H, daucosterol, 1,5-dimethyl citrate and shikimic acid (Yao *et al.*, 2014). The most important components of this natural medicine are vitamins E and C, lignans and essential oil in the seeds, which are responsible for different pharmaceutical properties (Yuan *et al.*, 2018). Other important chemical components extracted from fruits of *S. chinensis* are Limonene, β -Phellandrene, *p*-Cymene, γ -Terpinene, Terpinolene, Terpinen-4-ol, Thymol methyl ether, Bornyl acetate, α -Cubebene, β -Bourbonene, Sativen, β -Elemene, α -Santalene, α -Gurjunene, β -Farnesene, Caryophyllene, γ -Cainene, α -Cedrene, α -Bergamotene, Epizonarene, α -Muurolene, γ -Muurolene, β -Chamigrene, α -Himachalene, Acoradiene, β -Cadinene, Isoledene, Cuparene, Nerolidol, Calamenene, monoterpene hydrocarbons, sesquiterpene hydrocarbons and oxygenated monoterpenes (Choi *et al.*, 2006; Dai *et al.*, 2006; Chen *et al.*, 2011). Schisandrin A has anticarcinogenic effects and liver protection; Schisandrin B has shown liver protection, anti-allergy and anticarcinogenic properties; γ -Schisandrin has exerted liver protection and anticarcinogenic impacts; Schisandrin C may protect liver with anticarcinogenic, anti-HIV, and anti-hepatitis properties; Gomisin N has anti-proliferative activities, pro-apoptosis HepG2 cells, anti-HIV, anti-

hepatitis and anticarcinogenic activities (Panossian and Wikman, 2008; Oh *et al.*, 2010; Lee *et al.*, 2012).

Ajwain (*Trachyspermum ammi* L.)

Ajwain is an annual herb in the family Apiaceae, and it grows in dry, barren soil in its indigenous regions of Iran, India, Afghanistan and parts of northern Africa. The whole plant contains different phytochemicals such as chalcones, alkaloids, coumarins, glycosides, flavonoids, steroids, saponins and tannins (Shahrajabian and Sun, 2023a; Sun and Shahrajabian, 2023). The monoterpenes contents of ajwain are hydrocarbons, and two alcohols (Shahrajabian *et al.*, 2020; Sun *et al.*, 2024), and the main monoterpenes were α -phellandrene, γ -terpinene, *o*-carene, *p*-mentha-1,3,8 triene, β -pinene, β -myrcene, *p*-cumin-7-ol, *cis*-myrtenol and *Ot*-pinene (Shahrajabian *et al.*, 2020). The main component of seeds are thymol (Soltani *et al.*, 2018). It has been applied internally as household folk medicine for the remedy of cold, cough, diarrhea, asthma, cholera, influenza, and suitable for stimulating the appetite, and highly suggested to cure smooth functioning of the respiratory system, stomach discomfort and kidneys (Narendar and Khurana, 2018). Both crude aqueous extract and crude powder of its seeds had dose dependent anthelmintic impacts (Gaba *et al.*, 2018). The chemo-preventive potential of its seeds against carcinogenesis for doses 2%, 4%, and 6% have been suggested (Davazdahemami *et al.*, 2011). Its antioxidant characteristic may be because of the presence of thymol and strong synergism between all monoterpenes, and monoterpenoids constituents of essential oils (Kim *et al.*, 2016; Ranjbaran *et al.*, 2019; Kolbadinejad and Rezaei pour, 2020). Ajwain essential oil indicated antitermitic effects (Khan and Jameel, 2018; Wahab *et al.*, 2020), and nematocidal effects (Ramaswamy *et al.*, 2010; Talebi *et al.*, 2020; Bouzid *et al.*, 2022; Sakar *et al.*, 2023).

CONCLUSION

Common thistle has been used as spice in some traditional cooking and applied as both salad or a vegetable. In traditional medicine, its roots I astringent, tonic, antiphlogistic, diuretic, and hepatic, as well as its application for toothache. Wild garlic is appropriate in

treating chronic diseases, treats stomach problems, improves hearth health, anti-bacterial effects, and notable benefits for high cholesterol and blood pressure. The seeds of lychee can hold various beneficial functions in the field of food technology and pharmacy. The leaves of lychee have many pharmacological benefits such as anti-inflammatory and analgesic activity, anti-oxidant effects as well as hepatoprotective. Its flowers have cardiovascular activity, antioxidant, anti-lipase and cytotoxicity properties. Seeds have shown anti-cancer, antioxidant activity, anti-virus properties, reduce blood sugar and lipid levels. The fruits properties are aldose reductase inhibition activity, hepato-protective activity, antiviral characteristic, and anti-inflammatory effects. The five important ingredients of five flavor berry are Schisandrin A, Schisandrin B, Schisandrin C, Gomisin N, and γ -Schisandrin. Ajwain is a rich source of phenolics and volatiles, showing significant antioxidant and anticholinesterase properties. Thymol is the main component of seeds, and it has different pharmacological benefits such as antifungal, antibacterial, antioxidant, anti-inflammatory, cytotoxic, antibacterial, anthelmintic, and nematocidal activities. The seeds can be used as sialagogue, stimulant, carminative, stomachic, antihypertensive, antiseptic, antiparasitic, antispasmodic, antiscorbutic, vermicide, digestive, antiseptic, and emmenagogue activities. Traditional medicinal plants and herbs play important roles in food systems and sustainable agriculture, and they offer significant approaches to prevent and treatment of many diseases. More studies are needed to show the functions of natural products of these important medicinal plants to improve pharmaceutical sciences in an organic life.

Author Contributions

W.S.: writing-original draft preparations; M.H.S.: writing-original draft preparation, and editing. All authors have read and agreed to the published version of the manuscript.

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CONFLICTS OF INTEREST

The authors declare that they have no potential conflicts of interest.

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