

Spear Thistle (*Cirsium vulgare* L.) and Ramsons (*Allium ursinum* L.), Impressive Health Benefits and High-Nutrient Medicinal Plants

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ABSTRACT

Introduction: Rapid recent growth in consumption of traditional medicinal plants and herbs has become an indispensable part of health management in many countries. **Methods:** An online databases search of literature was carried out at Science Direct, PubMed/Medline, Scopus, and Google Scholar by using the keywords common sage, traditional medicine, pharmaceutical benefits and natural products for articles published until April of 2021. The author considered all the scientific papers available in the form of full text and open access, in English language. **Results:** Spear thistle is usually found in arid and semi-arid regions, as well as pastures and nitrogenous soil. Spear thistle contains different kinds of minerals, silica, mucilages, tannins, and bioflavonoids. It has been considered as spice in some traditional cooking and is used as a vegetable or salad. A decoction of the plant has been utilized to treat bleeding piles, and a hot infusion of the whole plant has been utilized as a herbal steam for treating rheumatic joints. Ramsons produce sulfide compounds like garlic and onions with similar medicinal impacts including cardiovascular benefits, antimicrobial

and antifungal properties, as well as being a tonic to the digestion, an immune booster. It is also good for the skin and an alternative treatment for blood pressure and platelet aggregation. **Conclusion:** Spear thistle and ramsons can promote good health and serve as a primary defense mechanism against diseases.

Key words: Spear thistle, Common thistle, Ramsons, Wild garlic, Traditional medicine, Health benefits.

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INTRODUCTION

The interest toward natural compounds in the prevention and treatment of various diseases such as cancer, diabetes, arthritis, coronary diseases, etc have been increased in recent years.¹⁻⁸ Herbs and their natural products are appropriate sources of natural substances with antioxidant, antibacterial, anti-tumoral and anti-diabetic activities, which are used in traditional medicine.⁹⁻¹⁹ All thistles are annual to biennial in growth form and they reproduce solely by seed and are prolific seed producers. *Cirsium vulgare* (Savi) Ten., is called spear thistle, bull thistle, or common thistle is a monocarpic, biennial weed which is native in Europe, western Asia and northern Africa.²⁰ The spear thistle has flower heads with bright florets and a ball of spiny bracts; its leaves are grey-green and spiny, and its tall stems are winged, spiny and cottony. It reproduces by seed, and the species has a two year life cycle, flowering and setting seed in the second year; seeds are short-lived on the soil surface but can persist for many years when they are buried, such as from cultivation activities. The spear thistle has many medicinal properties, and can be used as survival food if necessary. *Allium* is the most representative genus of the Liliaceae family, and is economically important genus because of the huge quantities of its consumptions.^{21,22} Ramsons, wild garlic or bear garlic (*Allium ursinum*) is probable one of the most famous wild leek species in Central Europe which grows in open forests, and both leaves and bulbs may be used in cooking with tremendous health benefits. This review summarizes the beneficial effects of *Cirsium vulgare* and *Allium ursinum*.

Spear Thistle, bull thistle, common thistle (*Cirsium vulgare* L.)

Spear thistle, which is considered one of the most prolific invasive species in the world is native to Eurasia and is naturalized in numerous countries, spreading to all continents except Antarctica.^{23,24} In the juvenile phase, individual bull thistle plants from a single rosette with a taproot up to 70 cm long. Rosettes may develop up to 1 m in diameters, and stems have spiny wings and grow 0.3 to 2 m tall, with many spreading

branches and sometimes a single stem. Seeds are products with a well-developed, yet easily removable pappus of soft, branching hairs, and despite the presence of a pappus, the majority of seeds are distributed in fodder, especially baled hay.²⁵ *Cirsium* is a source of neolignans and sesqueneolignans.²⁶ Six phenolic acids such as gallic, protocatechuic, gentisic, hydrobenzoic, vanillic and caffeic acids were detected in the fraction of free phenolic acids of the methanol extract of spear thistle.²⁷ Mass fragmentations and nuclear magnetic resonance (NMR) spectroscopy, proved that the two main medicinal lignin constituents of fruits of *Cirsium vulgare* are the neolignan-type, free balanophonin and the butyrolactone-type tracheloside.²⁸ The antiproliferative assay of the compounds isolated from *Cirsium vulgare*, confirmed a dose-dependent inhibitory effect of the structures of bearing the 4,7-epoxy moiety (balanophonin, picrasmalignan, desmethyl balanophonin, desmethyl picrasmalignan) against SW480 colon cancer cells, while those bearing 4,7-dihydroxy motif (prebalanophonin, prepicrasmalignan) were inactive.²⁹ Methanolic extracts from inflorescences and leaves of *Cirsium vulgare* showed a positive correlation between the total phenolic content and antioxidant activity for MeOH extracts and EtOAc fractions.³⁰

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

Wild garlic or Ramsons (*Allium ursinum* L.) is a traditional spice and a popular substitute for garlic in different countries.^{31,32} It is a dominant herb layer species in nutrient rich, deciduous forests of Central Europe, and it mainly relies on regeneration by seeds.³³ It is also a common vegetable in Russia, Ukraine and Caucasus.³⁴ It belongs to methiin/alliin-type *Allium* species, which means it contains mainly a mixture of (+)-S-methyl-L-cysteine-sulfoxide (methiin) and (+)-S-allyl-L-cysteine-sulfoxide, alliin.³⁵ It is a good source of both sulfur-containing substances and phenolic compounds,³⁶ and its leaves contain free forms of garlic, ferulic and vanillic acids, and bound forms of p-coumaric, ferulic and vanillic acids, while in its bulbs, free ferulic, p-hydroxybenzoic and vanillic

acids, and bound forms of p-coumaric and ferulic acids were found.³⁷ Seven flavonoid glycosides, kaempferol 3-O- α -L-rhamnopyranosyl (1 \rightarrow 2)-[3-O-acetyl]- β -D-glucopyranoside (1), kaempferol 3-O- α -L-rhamnopyranosyl (1 \rightarrow 2)-[6-O-acetyl]- β -D-glucopyranoside (2), kaempferol 3-O- α -L-rhamnopyranosyl-(1 \rightarrow 2)- β -D-glucopyranoside (3), kaempferol 3-O- β -D-glucopyranoside (4), kaempferol 3,7-di-O- β -D-glucopyranoside (5), 7-O- β -D-glucopyranosyl kaempferol 3-O- α -L-rhamnopyranosyl-(1 \rightarrow 2)- β -D-glucopyranoside (6), kaempferol 3-O- α -L-rhamnopyranosyl (1 \rightarrow 2)- β -D-glucopyranoside-7-O-[2-O-(trans-p-coumaroyl)]- β -D-glucopyranoside (7) were isolated from the n-butanol fraction of *Allium ursinum* L.³⁸ Wild garlic is an important source of polyphenols content and antioxidant activity which is widely grows in forests and next to the streams.³⁹ Sulfur-containing compounds of ramson are responsible for its traditional use in terms of culinary and medicinal purposes, and the main cysteine sulfoxide were alliin and isoalliin.⁴⁰ In traditional medicine, it has been used as a spice for thousand years, and it could be considered as a natural ingredient in food and pharmaceutical industries.⁴¹ Wild garlic may influence other herbaceous plants in plant community via soil and volatile compounds which inhibit seed germination and plant growth.³⁷ In previous reported studies, some of the most biological activities of wild garlic were antioxidant, cytostatic, antimicrobial and antidiabetic activities.⁴² Wild garlic may reduce serum cholesterol levels primarily by inhibiting cholesterol synthesis, and its extracts showed nearly identical efficiency to garlic extracts.⁴³ The main cystein sulfoxides are alliin, and isoalliin with several biological properties such as antioxidant effects, cytostatic and antimicrobial effects.⁴⁴ Wild garlic extracts exhibited certain antioxidant potential and strong antimicrobial activity against tested enteropathogenic strains (*Salmonella enteritidis* was the most sensitive, followed by *Escherichia coli*, *Proteus mirabilis* and *Enterococcus faecalis*), and it could be useful in treatment of mild gastrointestinal disturbances.⁴⁵ Both *Allium ursinum* and *Allium sativum* exert antiaggregatory effects, and their extracts are acting by inhibition of the adenosine diphosphate (ADP) pathway, with antiplatelet activity.⁴⁶ *Allium ursinum* volatile oil increased membrane fluidity, which could be an important feature for further studies of some disorders, such as atherosclerosis and hypertension.⁴⁷ Wild garlic extract has shown a protective effect on ISO-induced myocardial necrosis in rats by increasing antioxidant production.⁴⁸ A significant antimicrobial activity of the electrospun polylactide films containing the natural extract of *Allium ursinum* was achieved against foodborne bacteria.⁴⁹ Oral administration of *Allium ursinum* for 2 months is of a moderate hypoglycemic effect and attenuates the contractile responsiveness of the vascular system in diabetic rats.⁵⁰ Allicin analysis of *Allium ursinum* L. flower and leaf ethanol extracts by LC/MS and *in vitro* germination and growth inhibition effects on *Aspergillus niger*, *Botrytis cinerea*, *Botrytis paeoniae*, *Fusarium oysporum* f. dp. *Tulipae*, *Penicillium gladioli*, and *Sclerotinia sclerotiorum*, and the antifungal activity of the flower extract was stronger than that of the leaf extract, and that was correlated with a higher allicin content.⁵¹ Its leaf and flower extracts exert anti-inflammatory activity in the rat turpentine oil induced-inflammation model.⁵²

CONCLUSION

Spear thistle is an annual/biennial broadleaf weed growing to 1.5 meters. Its root is rich in inulin, a starch which passes straight through the digestive system. It has been considered as spice in some traditional cooking and used as a vegetable or salad. A decoction of the plant has been utilized to treat bleedings piles, and a hot infusion of the whole plant has been utilized as a herbal steam for treating rheumatic joints. The other most benefits are in oil, paper and tinder. In traditional medicine, its root is tonic, diuretic, astringent, anti-phlogistic and

hepatic, it has been applied as a remedy for toothache. Wild garlic is a member of the Liliaceae or lily family, which is an erect perennial native to Eurasia that has a winter growth habit. The most important health benefits of wild garlic are treating chronic diseases, improves heart health, treats stomach problems, antibacterial effects, it has tremendous benefits for blood pressure and high cholesterol, appropriate for infections and inflammations, suitable for the skin, ameliorate allergies and aggravations, aids in detoxification, and it is against fatigue. More researches are needed to show the roles of natural products of spear thistle and ramsons to improve modern pharmaceutical sciences in an organic life.

CONFLICT OF INTEREST

The author declare no conflict of interest.

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ABBREVIATIONS

NMR: Nuclear Magnetic Resonance; ADP: Adenosine diphosphate.

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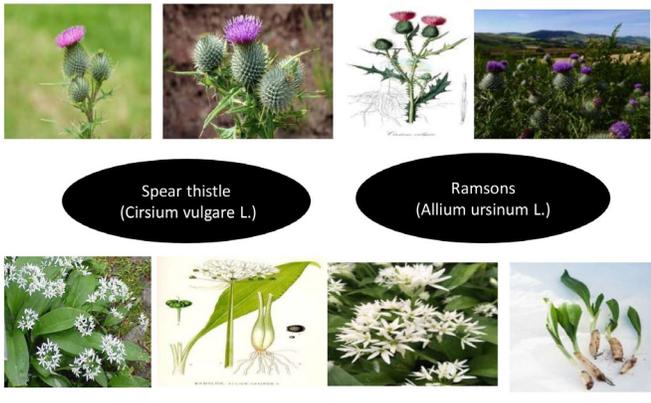
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SUMMARY

- Spear thistle is an annual/biennial broadleaf weed growing to 1.5 meters.
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- The most important health benefits of wild garlic are treating chronic diseases, improves heart health, treats stomach problems, antibacterial effects, it has tremendous benefits for blood pressure and high cholesterol, appropriate for infections and inflammations, suitable for the skin, ameliorate allergies and aggravations, aids in detoxification, and it is against fatigue.

PICTORIAL ABSTRACT



ABOUT AUTHORS



Dr. Mohamad Hesam Shahrajabian, he is a senior researcher of Agronomy and Biotechnology. He is interested in crops and herbs which are related to traditional medicine, especially Chinese and Iranian traditional medicine and crops relating to organic farming and sustainable agriculture.