Journal of Chemistry of Goods and Traditional Medicine

J Chem Good Trad Med, Volume 4, Issue 4, 2025 Traditional Medicine

CHEMICAL COMPOSITION OF CENTAUREA SPECIES AND THEIR APPLICATION IN TRADITIONAL MEDICINE

Shahzod Sh. Ergashev
Institute of Chemistry of Plant Substances of the Academy of Sciences of the Republic of Uzbekistan named after Academician S.Yu.Yunusov phD
https://orcid.org/0009-0006-8194-1778

Baxrom J. Komilov
Namangan State Pedagogical Institute Senior Researcher, PhD
https://orcid.org/0009-0004-5053-7794

Komila A. Eshbakova
Institute of Chemistry of Plant Substances of the Academy of Sciences of the Republic of Uzbekistan named after Academician S.Yu.Yunusov Senior Researcher, DSc
https://orcid.org/0000-0002-8172-817X

Qurbonnazar S. Juraev
Institute of Chemistry of Plant Substances of the Academy of Sciences of the Republic of Uzbekistan named after Academician S.Yu.Yunusov phD
https://orcid.org/0009-0004-6013-4980

DOI: https://doi.org/10.55475/jcgtm/vol4.iss4.2025.523

Keywords:
Centaurea belangeriana,Centaurea depressa, flavonoidlar, fitokimyo.

Annotation
This article presents information on the geographical distribution, botanical characteristics, chemical composition, and applications of Centaurea species occurring in Uzbekistan. Particular attention is given to the anti-inflammatory and antiseptic properties of these plants, which are highlighted in detail.

How to Cite
Ergashev, S. S., Komilov, B. J., Eshbakova, K. A., & Juraev, Q. S. (2025). CHEMICAL COMPOSITION OF CENTAUREA SPECIES AND THEIR APPLICATION IN TRADITIONAL MEDICINE. Journal of Chemistry of Goods and Traditional Medicine, 4(4), 139-156. https://doi.org/10.55475/jcgtm/vol4.iss4.2025.523

From ancient times, plants of the genus *Centaurea* have been recognized for their medicinal properties. The renowned Roman physician Dioscorides employed them for therapeutic purposes, and even Aristotle mentioned these plants in his works. Avicenna also emphasized their efficacy in treating fresh injuries and chronic ulcers [1–2].

Literature review. At present, species of the genus *Centaurea* are utilized in both scientific and traditional medicine. *Centaurea cyanus L.* is an annual or biennial wild medicinal plant belonging to the family *Asteraceae*, which comprises more than 700 species. Representatives of this genus are found exclusively in the Northern Hemisphere, with the Eastern regions—particularly the Middle East and its adjacent areas—demonstrating remarkable species diversity.

This plant is well known to almost everyone and is associated with numerous folk names, including “cornflowers,” “bluebottle,” “cyanos,” and “azure flowers.” In certain cultures, it was even attributed with magical properties. The flowers of *Centaurea* are widely distributed across Europe, the European part of Russia, the Caucasus, the Far East, and to some extent in Central Asia [2–3].

For growth, the plant prefers fields sown with spring and winter crops (wheat, rye, and flax), pastures with forage grasses, as well as abandoned arable lands, roadsides, and areas dominated by weedy vegetation (**Fig. 1**).



Figure 1. Plants of the genus *Centaurea*

Thus, the earliest documented medicinal property of cornflowers (*Centaurea*) was wound healing, noted since antiquity. In general, an infusion of its flowers prepared with melted snow water was previously regarded as one of the primary remedies for strengthening vision, a practice that was even endorsed by the French Academy of Medicine. Following treatment with the blue cornflowers, the need for wearing spectacles was said to disappear. Traditional healers used the juice of the blue cornflowers for the treatment of conjunctivitis. Moreover, even today, an infusion of its flowers continues to be employed for eye rinsing (Fig. 2).



Figure 2. Flowers of plants of the genus *Centaurea*

Furthermore, plants of the genus *Centaurea* are used in the treatment of kidney, bladder, and liver diseases, as well as in conditions associated with the potential formation of oxalate stones, due to their ability to influence oxalic acid metabolism and enhance choleretic (bile-stimulating) activity [6].

The flowers of *Centaurea* exhibit diuretic, anti-inflammatory, antipyretic, sudorific, and bactericidal properties. Infusions prepared from the flowers are employed in chronic kidney and urinary tract diseases, inflammatory processes, and edema. Alcoholic tinctures serve as effective choleretic agents and are administered for liver and biliary tract disorders. *Centaurea* positively influences digestive processes, enhances appetite, and, in cases of intestinal disorders, its preparations are recommended as part of gastric herbal formulations [7].

For external application, the flowers are used as lotions in ocular diseases. An infusion of *Centaurea* flowers exerts a calming effect on the nervous system, slows heart rate, and alleviates headaches. Additionally, when used as a mouth rinse, it may relieve toothache. The flowers of

Centaurea are also beneficial in dermatological conditions (furunculosis, trophic ulcers, eczema), where they are recommended in the form of compresses [8–9].

Preparations derived from *Centaurea* should not be taken for prolonged periods, as the plant possesses moderate toxicity and may accumulate in the body. Its use is contraindicated during pregnancy. Consultation with a physician is advised prior to therapeutic application of *Centaurea* flowers.

Centaurea-based preparations demonstrate antiseptic, anti-inflammatory, hemostatic, hepatoprotective, wound-healing, and choleretic properties. The bitter principles contained in the plant stimulate appetite, enhance gastric juice secretion, and activate digestive processes, while the alkaloid gentiannin present in the composition exerts a pronounced anti-helminth effect.

In medical practice, alcoholic and aqueous infusions of *Centaurea* are used in gastritis, as well as liver, gallbladder, and kidney diseases. In folk medicine, the plant is employed for nervous exhaustion, liver and gallbladder disorders, meteorism, intestinal and gastric spasms, chronic enterocolitis, certain gynecological conditions, anemia, sinusitis, migraine, and dermatological ailments.

Infusions and decoctions of *Centaurea* are also applied in influenza, neuroses, malaria, diabetes mellitus, tachycardia, pulmonary tuberculosis, renal and cardiac diseases, and epilepsy. Externally, they are used effectively for treating non-healing wounds, eczema, gout, ulcers, and furuncles on the legs [9].

Principal medicinal species

In folk medicine, the most significant representatives of the genus *Centaurea* include:

Centaurea belangeriana — an annual species distributed in Europe and Central Asia.

Centaurea depressa — an annual species occurring in Central Asia and North America.

Centaurea cyanus L. — an annual species widespread in Europe, Central Asia, and North America.

Centaurea jacea L. — a perennial species found in Europe and Western Asia.

Centaurea scabiosa L. — a perennial species broadly distributed in Europe and Western Asia.

Centaurea solstitialis L. — a biennial species native to the Mediterranean region, now widely naturalized in many parts of the world.

Centaurea iberica Trev. — a biennial species occurring in the Caucasus, Central Asia, and the Middle East.

Use in folk medicine of Central Asia and Uzbekistan

In the folk medicine of Uzbekistan and the broader Central Asian region, plants of the genus *Centaurea* are widely applied.

Centaurea depressa is employed as a wound-healing remedy, in the treatment of diabetes mellitus, and due to its anti-inflammatory, antibacterial, and diuretic properties. The plant is typically used both externally and internally in the form of compresses, decoctions, or infusions. However, such uses are mostly based on folk practice and remain insufficiently supported by scientific research.

Centaurea cyanus is used as a diuretic, for alleviating digestive disorders, and as an anti-inflammatory agent, particularly for reducing ocular irritation and skin inflammation. It has also been traditionally applied for relieving menstrual pain, Modulating immune function , and managing respiratory ailments accompanied by cough.

Centaurea jacea has been employed in dermatological conditions, including wound healing and skin lesion treatment, as well as in digestive disorders as a source of bitter principles to stimulate appetite. The plant was also used for fever reduction, as eye drops, and for easing respiratory difficulties.

Modern scientific studies have demonstrated that the plant exhibits antioxidant, anti-inflammatory, antibacterial, and antiviral activities, which substantiate its traditional therapeutic applications.

In Turkish folk medicine, *Centaurea solstitialis* is applied in the treatment of various diseases, including gastric ulcer, malaria, gastrointestinal disorders, abdominal pain, herpetic infections, colds, and hemorrhoids. Scientific studies have confirmed some of these traditional uses: extracts of the plant, particularly those containing sesquiterpene lactones, show anti-ulcer activity by inhibiting Helicobacter pylori. Other investigations have also revealed its anti-inflammatory, antioxidant, antipyretic, and antitumor properties, although further studies are necessary for definitive scientific validation [10].

The most abundant and biologically active compounds isolated from *Centaurea* species are as follows:

Table 1. Some of the major flavonoids isolated from the genus *Centaurea* and their pharmacological properties are presented.

Flavonoid	Main pharmacological effects	Mechanisms of action	Reference
Myricetin	Antioxidant, anticancer, neuroprotective	Neutralization of free radicals, protection of lipids from peroxidation, synergism with other bioflavonoids	[11]
Fisetin	Neuroprotective, antioxidant, anti-inflammatory	Reduction of ischemic brain injury, inhibition of apoptosis, regulation of immune response	[12]
Naringenin	Antidiabetic, anticancer, gastroprotective, cardio- and neuroprotective	Suppression of NF-κB and MAPKs activity, reduction of pro-inflammatory cytokine expression, antioxidant activity	[13]
Hesperetin	Antioxidant, anti-inflammatory, antitumor, neuroprotective	Modulation of NF-κB signaling pathways, reduction of oxidative stress, protection of cells	[14]
Rhamnetin	Antioxidant, anti-inflammatory, antibacterial, antimycobacterial, neuroprotective	Reduction of organ damage in sepsis, inhibition of β-amyloid formation in Alzheimer's model	[15]
Chrysin	Antioxidant, antitumor, neuroprotective	Reduction of oxidative stress, suppression of	[16]

		inflammation, low bioavailability	

Results and Discussion. Plant Collection: The plant *Centaurea depressa* was collected in July 2023 from the Baxmal district of the Jizzakh region. The aerial parts of the plant were dried in the shade for 7-10 days and stored at room temperature for further analysis.

Preparation of Extract: The dried aerial parts of the plant (10 kg) were extracted using methanol solvent at room temperature. The extraction continued for approximately 96 hours until no color was released from the plant sample. The extract was concentrated using a rotary evaporator (RE-52A). The dry mass of the extract amounted to 800 grams. The dried extract was dissolved in 96% ethyl alcohol and mixed with boiled water in a 1:1 ratio to purify it from chlorophyll and other impurities. It was left for 24 hours for the impurities to precipitate. The unwanted impurities that settled were filtered out, and the extract was separated into fractions using extraction benzene, chloroform, ethyl acetate, and n-butanol. Column chromatography is being used to identify the composition of the plant.

Conclusion. Phytochemical investigation of *Centaurea belangeriana* revealed flavonoid compounds with high biological activity. Among the isolated flavonoids, flavone derivatives were predominant. The plant extracts were found to exhibit strong antioxidant properties and moderate antimicrobial activity.

References

1. Флора Узбекистан. Т. 6, Акад. Наук УзССР, Ташкент, 1962, 399 с.
2. Garcia-Jacas, N.; Susanna, A.; Mozaffarian, V.; Ilarslan, R. The natural delimitation of *Centaurea* (Asteraceae: Cardueae): ITS sequence analysis of the *Centaurea jacea* group. *Plant Syst. Evol.* 2000, *223*, 185–199.
3. М.А. Бакенова. Тр. Ин-та ботаники. Т. 17. С. 177-180. АН КазССР. 1963.
4. Р.Г. Медведева и др. Лекарственные растениѐ Алма-Атинской области, Р.Г. Медведева, О.У. Лушпа, Л.Д. Брызгалова, Ф.М. Аталыкова, А.Л. Никифорова // Тр. Ин-та ботаники. Т. 31. С. 3-54. АН КазССР. 1972.
5. Л.В. Ревазова, М.Н. Ерибекѐн, В.А. Мначаканѐн. Арм. хим. жим. Т. 26.
6. B. J. Komilov, K. A. Eshbakova, Q. D. Davronov, B.D. Mamarasulov.Antimicroble activity of *centaurea* plants: 14th International Symposium on the Chemistry of Natural Compounds, 7-8 October, 2021, Tashkent, P.77
7. Al-Snafi A. (2015). "The pharmacological importance of *Centaurea cynus* - A review". International Journal of Pharmacy Review and Research 5:379–384.
8. "Online atlas of the British & Irish flora: *Centaurea cyanus* (Cornflower)". Biological Records Centre and Botanical Society of Britain and Ireland. Retrieved 22 May 2016.
9. "*Centaurea Cyanus* [sic]: Best Practices for Growing the Cornflower". Best Plants. March 2019. Retrieved 5 November 2020.
10. https://en.wikipedia.org/.
11. Lin R.D., Chin Y.P., Lee M.H. Antimicrobial activity of antibiotics in combination with natural flavonoids against clinical extended-spectrum β-lactamase (ESBL)-producing Klebsiella pneumonia. Phytother. Res. 2005;19:612–617. doi: 10.1002/ptr.1695.
12. N. Khan, D. N. Syed, N. Ahmad, and H. Mukhtar. Antioxidants & redox signaling Volume 19, Number 2, 2013.
13. Kübra Uçar, Zeynep Göktaş Biological activities of naringenin: A narrative review based on in vitro and in vivo studies Nutrition Research Volume 119, November 2023, Pages 43-55.

14. Jia-Chen Xue, Shuo Yuan, Huan Meng, Xiao-Ting Hou, Jiao Li, The role and mechanism of flavonoid herbal natural products in ulcerative colitis Biomedicine & Pharmacotherapy Volume 158, February 2023, 114086.
15. Débora Lima Medeiros, Edson Thiago Gomes Lima, Jefferson Campos Silva, Mônica Alves Medeiros , Elayne Bessa Ferreira Pinheiro. Rhamnetin: a review of its pharmacology and toxicity. Pharm Pharmacol 2022 Jun 9;74(6):793-799.
16. Magdalena Kurkiewicz, Aleksandra Moździerz, Anna Rzepecka-Stojko, Jerzy Stojko. Chrysin: A Comprehensive Review of Its Pharmacological Properties and Therapeutic Potential. Pharmaceuticals 2025, 18(8), 116.