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Review Article

Genus *Cirsium:* Ethnomedicine uses, Phytochemistry and Pharmacological Potential

Anamika Sharma[1], Madhvi Negi[2], Ria[3], Harsharan Singh[4*]

[1]Research scholar, Central University of Himachal Pradesh, Department of Plant Sciences, Shapur, Kangra-176206, Himachal Pradesh, India. Email: anamikasharma3485@gmail.com, ORCID: 0009-0006-4707-085X
[2]Research scholar, Central University of Himachal Pradesh, Department of Plant Sciences, Shapur, Kangra-176206, Himachal Pradesh, India. Email: madhvinegi17@gmail.com
[3]Research scholar, Central University of Himachal Pradesh, Department of Plant Sciences, Shapur, Kangra-176206, Himachal Pradesh, India. Email: mriarehan@gmail.com
[4]Associate Professor, Central University of Himachal Pradesh, Department of Plant Sciences, Shapur, Kangra-176206, Himachal Pradesh, India.

***Correspondence**
Harsharan Singh
Email: harsharan@hpcu.ac.in; ORCID ID: 0009-0006-4473-8244

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The genus *Cirsium* Mill. (Asteraceae) comprises a diverse family of herbaceous perennial and biennial plants, dispersed throughout North America, Europe, and Asia's temperate areas. Various members of this genus have been widely used in traditional medicines to treat inflammation, bleeding, liver diseases, stomach ailments, and wounds. This review attempts to create a comprehensive knowledge about the ethnomedicinal uses, phytochemical composition, pharmacological activities and prospects for research of *Cirsium* species. Phytochemical studies have identified a variety of bioactive compounds such as polyphenolic acids, flavonoids, lignans, terpenoids, polyacetylenes and sesquiterpene lactones. Various species have been reported with the presence of major compounds like apigenin, cirsimaritin, pectolinarin, luteolin, chlorogenic acid, and cnicin, and each of these compounds has various biological activities. Experimental studies have shown evidence of antioxidant, hepatoprotective, antimicrobial, anti-inflammatory, anticancer and wound-healing activity, which is consistent with some of the traditional therapeutic claims. *Cirsium* species are also important nectar and pollen sources for pollinators, such as bees, butterflies, and plays very important role in the ecosystem. However, a large number of species still have insufficient research in this regard, and these species are especially prevalent in the Himalayas. Comprehensive phytochemical characterization, molecular authentication, pharmacological validation and conservation strategies need to be explored and developed for sustainable utilization and therapeutic exploitation of this medicinally important genus in the future.

Keywords: *Cirsium, Ethnobotany, Phytochemistry, Asteraceae, Cirsimaritin*

Introduction

Medicinal plants are known for their medicinal potential, owing to the presence of various bioactive compounds in their plant parts (Sharma et al., 2022a). The greatest number of species with potential for therapeutic use are found in the Asteraceae and Lamiaceae families of the plant world. Numerous members of the Asteraceae family are extremely bioactive, according to phytochemical studies of this family. The medicinal plant diversity is affected by various climatic factors, and these lead to variation in their secondary metabolite content (Sharma et al., 2020a; Sharma et al., 2022c). As a result, herbal treatments are highly respected worldwide. As a result, both developed and developing countries now place a high priority on ensuring the safety, efficacy, and quality of medicinal plants. (El-Saadony et al.,2025) The second-largest tribe in the Asteraceae family, Astereae, has many species of significant commercial and therapeutic value (Qu T et al., 2025). Plants in the Asteraceae family most likely originated in the middle to late Cretaceous epoch. The family's plants were initially discovered in southern South America. The majority of the Asteraceae family's genera are worldwide and have been shown to colonise a variety of environments, from the tropics to the Arctic regions. Because of their extensive range and greater tolerance to environmental conditions, they can be found on every continent (JL Panero et al., 2016). The majority of species that have been reported come from hot semi-desert, cold desert, and hot desert regions (Sharma et al., 2022b). The Asteraceae family is distinguished by a diverse array of herbaceous plants with stems that can be either erect or prostrate in development form. A notable characteristic of the family is the existence of a peculiar inflorescence termed capitulum, wherein multiple little florets are densely placed on a shared receptacle and encircled by involucral bracts, creating the illusion of a singular flower (Xu et al., 2017). The leaves are typically placed alternately along the stem, though differences may exist among species. The majority of members exhibit a robust tap root structure that facilitates anchoring and nutrient absorption. A notable attribute is the presence of a pappus, a modified calyx made of hairs, scales, or bristles that aids in wind-mediated seed distribution by functioning as a parachute mechanism (Patil et al., 2025). In several studies (Mahmood et al.,2016; Carvalho et al., 2018; Rolnik and Olas, 2021), this family is considered to have a great economic and therapeutic importance. The Asteraceae family of plants are also used to produce herbal tea, oil, salads, sweetening agents, dyes, and coffee substitutes (Panero and Funk, 2002). Most plants of this family are therapeutic medicinal herbs. These are *Emilia*, *Pluchea*, *Chromolaena*, *Carthamus* and *Achillea*; *Cirsium* is quite famous due to its traditional medical use. The medicinal value and the richness of phytochemicals present in medicinal plants is not new. The advancement in genetic and molecular studies may be adopted for more exploration of the therapeutic potential uses (Kumar et al., 2024; Sharma et al., 2022d).

Cirsium

Field thistle, common thistle and plume thistle are the vernacular names of the *Cirsium* genus and are commonly used to refer to certain genera, such as *Carduus*, *Silybum*, and *Onopordum*. *Cirsium* is regarded as a weed that may grow anywhere, even close to agricultural land. They may have an allelopathic effect and provide biological pest management even if they are considered weed. Because of their aesthetic value, some species are even planted in gardens (Tang et al., 2024). Around 450 species of *Cirsium* can be found worldwide. There are about 200 of them spread across North America, Europe, Asia, Central America, and North Africa. About 16 of these species, *C. eriophoroides, C. argyracanthum, C. falconeri, C. arvense, C. interpositum, C. verutum, C. nishiokae, C. glabrifolium, C. shansiense, C. wallichii etc.* which are known to exist in Indian evergreen forests as well as some areas bordering China and Nepal (Aggarwal et al., 2022). Significantly, *Cirsium* species have demonstrated promise as secure and efficient agents in the management of liver diseases, indicating the possibility of creating new hepatoprotective medications (Aggarwal et al.,2022). For hundreds of years, the species in the genus *Cirsium* have been utilised in traditional Chinese medicine; 50 species known to exist in China are approved for use in medicine, including to treat bleeding syndrome, reduce swelling, halt bleeding, and remove blood stasis (Wang et al., 2019). The entire grass of the *Cirsium* plant was utilised as medicine, particularly the leaves, roots, and flowers. The antimicrobial elements are very useful for medical studies.

Distribution

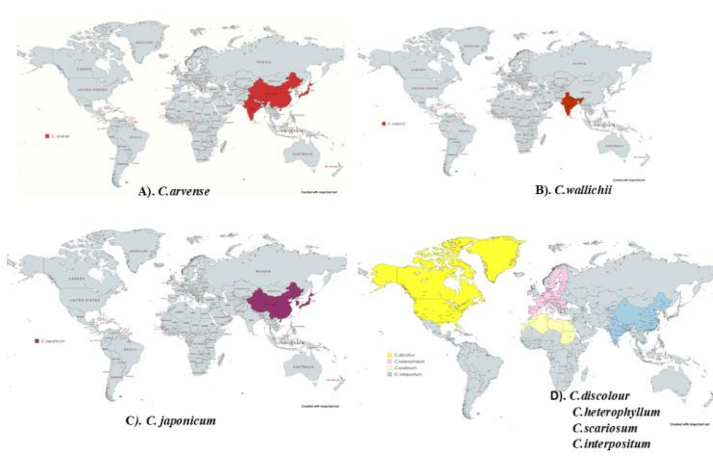


Figure 1 (A-D). Geographical distribution of selected *Cirsium* species across different regions of the world. Map created by authors using MapChart (https://www.mapchart.net/).

Table 1. Different species of the *Cirsium* genus and their distribution across the world

S.no.	Species Name	Common Name	Native/Regional Distribution	Presence in India	Reference
1.	*Cirsium arvense*	California thistle, Canada thistle, creeping thistle,	Haryana, Afghanistan, Siberia, China, Japan, Europe, North Africa, and Asia Minor	Yes	(Tiley,2010), (Balkrishna et al., 2024).
2.	*Cirsium wallichii*	Himalayan Thistle, Wallich's thistle, bungsee	Western Himalayas, Jammu and Kashmir (India, Nepal, Bhutan)	Yes	(Siddiqui et al., 2016)
3.	*Cirsium japonicum*	Japanese Thistle	Asian countries, including China, Japan, Korea, and South Korea	No	(Fang et al., 2024)
4.	*Cirsium vulgare*	spear thistle, bull thistle, or common thistle	Europe to the Arabian Peninsula and Siberia, West The Himalayas	Yes	(Klinkhamer et al., 1993)
5.	*Cirsium discolor*	field thistle	North American New York	No	Flora of North America @ efloras.org
6.	*Cirsium heterophyllum*	Melancholy thistle	Europe and western Asia	No	Portale della Flora d'Italia - Portal to the Flora of Italy
7.	*Cirsium scariosum*	Meadow Thistle, dwarf thistle	Western North America (Rocky Mountains to Pacific Coast)	No	https://efloraofindia.com/
8.	*Cirsium texanum*	Texas Thistle	Southern USA and Northern Mexico	No	https://efloraofindia.com/
9.	*Cirsium eriophorum*	Woolly Thistle	Europe (grasslands, dry slopes)	No	https://efloraofindia.com/
10.	*Cirsium verutum Syn. C. argyracanthum*	Common Thistle, Thakal, Sungure kanda	750-2200m; Afghanistan, Pakistan, Himalaya, Muree to Bhutan		https://efloraofindia.com/
11.	*C. lineare*	-	-	-	https://efloraofindia.com/
12.	*C. eriphoroides*		East Himalaya (Sikkim, Arunachal)	Yes	https://efloraofindia.com/
13.	*C. flavisquamatum*	-	-	-	https://efloraofindia.com/
14.	*C. interpositum*	-	Tibet, India (Arunachal Pradesh, Manipur), China (SW-Yunnan), and Bhutan	Yes	https://efloraofindia.com/
15.	*C. nishiokae*	Nishioka's thistle	Indian Himalaya, Darjeeling, Nepal	Yes	https://efloraofindia.com/
16.	*C. shanisiense*		China, Myanmar [Burma], Bhutan, India (NE India, NW Himalaya, Meghalaya), Northeast Tibet,	Yes	https://efloraofindia.com/
17.	*C. souliei*		China, India (Sikkim)	Yes	https://efloraofindia.com/
18.	*C. tibeticum*		3000m; Himalaya (Nepal to Bhutan, Tibet)		https://efloraofindia.com/
19.	*C. falconeri*	Bhoosh	India	Yes	https://efloraofindia.com/

Morphology

Cirsium arvense: *Cirsium arvense* (Canada thistle), an herbaceous wild plant, is characterized by its rhizomatous perennial growth habit, enabling easy vegetative reproduction and broad dispersal (Ullah et al., 2023). Its stems are typically erect and branched, ranging from 30 to 150 cm in height. The leaves are deeply pinnatifid with spiny margins, and the capitula are small (1.5–2 cm), purple, clustered in corymbs, and possess slender, spine-tipped phyllaries (Ivanova et al., 2025). *C. arvense* is recognized as an invasive species in various regions, including the trans-Himalayan area of Ladakh, where its functional traits, such as leaf thickness and leaf mass per area, vary with local habitat heterogeneity (Lvanova et al., 2025; Hakim et al., 2023). Traditionally used as a tonic and for treating ailments such as diarrhoea and tuberculosis, it is a diuretic 1011. The plant's mesophyll traits, including higher leaf thickness and lower leaf dry matter content compared to *Artemisia vulgaris*, contribute to its harmfulness in agroecosystems (Ivanova et al., 2025).

Cirsium wallichii: *Cirsium wallichii*, a robust perennial from the Himalayas, generally grows taller than *C. arvense*, reaching heights of 1–2 m. Its basal leaves are large, broadly ovate to triangular-lanceolate, featuring irregularly dentate-serrate margins and prominent spines. Stem leaves are sessile and auriculate-clasping. The species produces large, solitary or few-flowered capitula (3–4 cm) with purplish-red florets and strongly spiny, appressed phyllaries. It acts as a significant nectar source for a diverse array of butterfly species, contributing to biodiversity in its native habitats (Boruah et al., 2020).

***Cirsium japonicum*:** (Japanese thistle) is a stout, pubescent perennial, typically growing to 1–1.8 m in height. Its basal leaves are broadly lanceolate to elliptic, shallowly to deeply pinnatifid, with spiny-dentate margins and often hairy undersurfaces. Capitula are large (3–4 cm), solitary or arranged in loose corymbs, with rose-purple to violet florets and subequal, spiny phyllaries. *C. japonicum* is widely recognized in Eastern medicine for its anti-inflammatory, antioxidant, anti-tumour, and hepatoprotective qualities, attributed to its rich composition of flavonoids, sterols, lignans, and polyacetylenes (Yu et al., 2019; Aggarwal et al., 2022).

Figure 2 (A-F): Morphological diversity in the genus *Cirsium* (Asteraceae). A). *C. arvense*, B). *C. wallichii*, C). *C. vulagre*, D). *C. verntrum* E). *C. nishiokae* F). *C. heterophyllum.*
Source: https://efloraofindia.com/

Cirsium vulgare: *Cirsium vulgare* (bull thistle) is a biennial or short-lived perennial plant, which may grow 0.5–2 m tall. It has a dense white-tomentose stem and leaves. The basal rosette leaves are large and deeply lobed with stiff yellow spines. The stem leaves are sessile, spinous, and decurrent. It has large (3-5 cm), solitary, globose capitula with purple florets and very imbricated, spiny, spine-tipped phyllaries forming a dense spiny involucre. *C. vulgare* is a listed injurious weed because of its effects on communities of plants (Maskell et al.,2020).

***Cirsium heterophyllum*:** *Cirsium heterophyllum* (melancholy thistle) is a glabrous or sparsely pubescent perennial, growing 0.4–1.2 m tall. Its leaf morphology is variable, with basal leaves being broadly ovate to lanceolate, pinnatifid with obtuse to acute lobes, and bearing soft spines. Stem leaves are smaller, sessile, and less spiny. The capitula are 2–3 cm, usually solitary, with pale purple to whitish florets and slender, weakly spiny phyllaries **https://efloraofindia.com/.**

Cirsium nishiokae: *Cirsium nishiokae*, an endemic species to Japan, is a relatively smaller perennial, typically 30–80 cm in height. Its basal leaves are narrowly lanceolate to linear-lanceolate, shallowly pinnatifid, and possess fine, soft spines. Stem leaves are reduced, linear, and either entire or slightly toothed. The capitula are small (1.5–2.5 cm), few in number, with pale pink to lavender florets and narrow, subequal, weakly spiny phyllaries **https://efloraofindia.com/.**

Traditional uses

Ethnobotanical uses of medicinal plants are the knowledge transfer from ancestors to the further generation (Sharma et al., 2021a). This traditional knowledge is the main healthcare option in tribes and hilly areas, where people have limited modern facilities (Sharma et al., 2020b); folklore and ritualistic adoption of the indigenous system (Sharma et al., 2020c) and conservation through sacred and cultural practices (Sharma et al., 2020d).

Table 2. Traditional uses and plant parts used to treat various ailments.

S.no.	Species Name	Plant Part Used	Traditional Uses	References
1.	*Cirsium arvense*	Leaves, whole plant	Treat a variety of illnesses, like pharyngitis, dentalgia, ulcers, mouth infections, leukaemia, and canker sores.	(Tiley et al.,2010)
2.	*Cirsium wallichii*	Leaves, stem	pyrexia, alleviation from bleeding, scorching feeling, and inflammation of the stomach	(Aggarwal et al.,2022)
3.	*Cirsium japonicum*	Aerial parts, roots	anti-hemorrhagic, cancer, hypertension, and hepatiti	(Aggarwal et al.,2022)
4.	*Cirsium vulgare*	Leaves, root, whole plant	Anxiolytic	(Aggarwal et al.,2022)
5.	*Cirsium discolor*	Leaves, roots	Nector rich flower that attract bumblebees, insects and butterflies.	(Aggarwal et al.,2022)
6.	*Cirsium heterophyllum*	Root, leaves	Roots and leaves are used as a tonic to help improve overall health, as well as to treat digestive and liver problems, arthritis, gout, and rheumatism.	(Aggarwal et al.,2022)
7.	*Cirsium scariosum*	Roots	In traditional practices, parts of the plant have been used for medicinal purposes.	(Aggarwal et al.,2022)
8.	*Cirsium texanum*	Leaves	-	(Aggarwal et al.,2022)
9.	*Cirsium eriophorum*	Leaves, flower heads	Cure of hepatic Infections and Detoxification.	(Aggarwal et al.,2022)
10.	*Cirsium verutum Syn. C. argyracanthum*	Roots, leaves	Arthritis, haemorrhage, chest ache, measles, purgative, typhoid, tuberculosis, dyspepsia, dysentery, and pharyngitis.	(Aggarwal et al.,2022)
11.	*C. eriophoroides*	Leaves, flower heads	Treat cold, fever and cough.	**https://efloraofindia.com/**
12.	*C. interpositum*	Young shoots	-	**https://efloraofindia.com/**

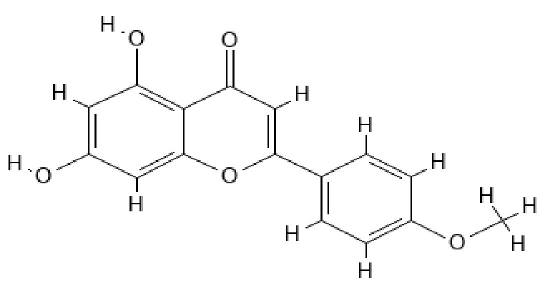
Culinary Uses of *Cirsium:* It is possible to eat *Cirsium*'s leaves, roots, and stems either raw or cooked. This plant has historically been combined with other vegetables or added to salads. The stem is peeled and cooked, leaves are used to make tea contain medicinal properties. *Cirsium* leaves can be eaten raw or cooked, and they have a rather moderate flavour. Consuming cooked leaves has the dual benefits of being a liver tonic and a diuretic. Additionally, a concoction of the soaked *Cirsium* roots and leaves is utilised as a treatment for neurological issues. *Cirsium*'s roots and flowers are used to make an infusion that may be applied topically or consumed. Both cooking and lamp oil are made from *Cirsium* seed oil. The culinary uses are for routine daily purposes use in foods Sharma et al., 2024a; Sharma et al., 2024b).

Phytochemicals

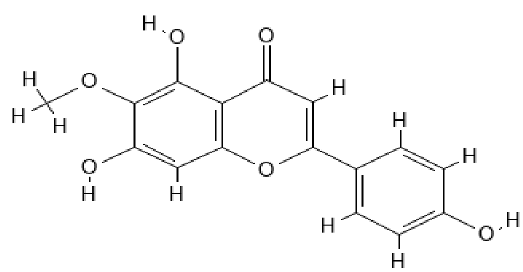
Table 3. Showing major bioactive compounds.

S.no	Species Name	Major Classes of Phytochemicals	Bioactive Compounds
1.	*Cirsium arvense*	Flavonoids, Terpenes, Cyclic ether, Steroids, Steroidal glucoside, Alkaloids.	Citronellol, Acacetin, Hispidulin, Pectolinarigenin, Luteolin, Tracin, Scopoletin, Apigenin, and Ciryneol
2.	*Cirsium wallichii*	Phenolic acids	Acetyljacoline, Fumaric acid
3.	*Cirsium japonicum*	Flavonoids Phenolic compound Triterpenoid	Coumaric acid, Syringin, Cirsimaritin, Pectolinarigenin, Ciryneol, Linarin, Luteolin, Pectolinarin, and Lupenyl Acetate
4.	*Cirsium vulgare*	Flavonoid	Quercetin, Apigenin, Kaempferol and Luteolin
5.	*Cirsium discolor*	-	-
6.	*Cirsium heterophyllum*	-	-
7.	*Cirsium scariosum*	-	-
8.	*Cirsium texanum*	-	-
9.	*Cirsium eriophorum*	Phenol, Flavonoid, Triterpenoid, Phytosterol	Balanophonin, Apigenin, Kaempferol, Taraxasterol, Sitosterol, Vanillic acid, and Linoleic acid
10.	*Cirsium verutum Syn. C. argyracanthum*	Triterpenoid Flavonoid	Pectolinarigenin, Cirsitakaogenin, Lupeol, Taraxasterol acetate, Pectolinarin, and Cirsitakaoside.

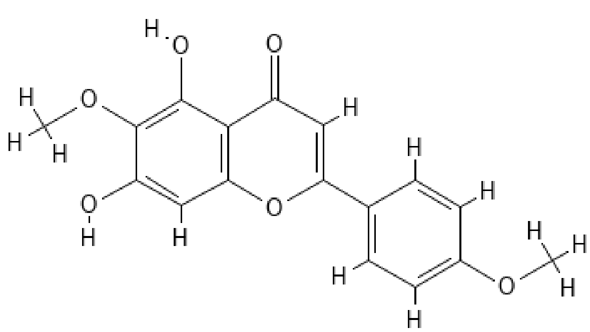
Structure of bioactive compounds



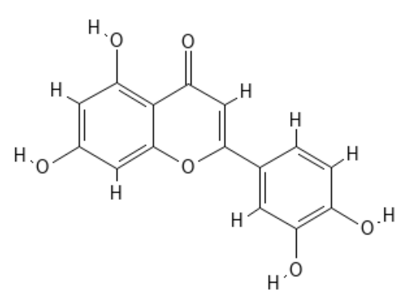
A) Acacetin



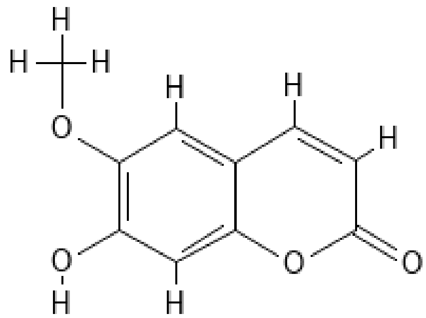
B) Hispidulin



C) Pectolinarigenin

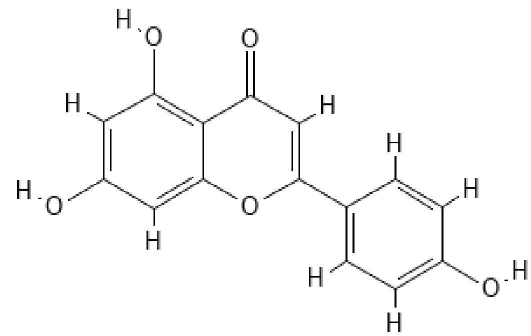


D) Luteolin

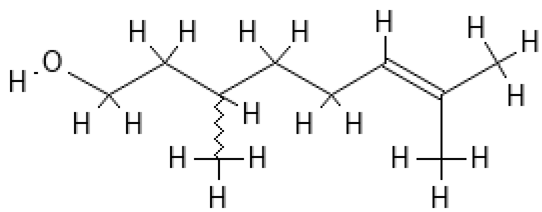


D)

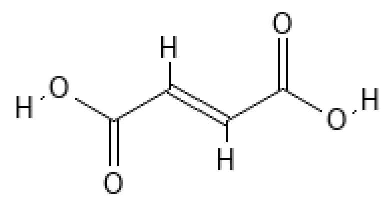
E) Scopoletin



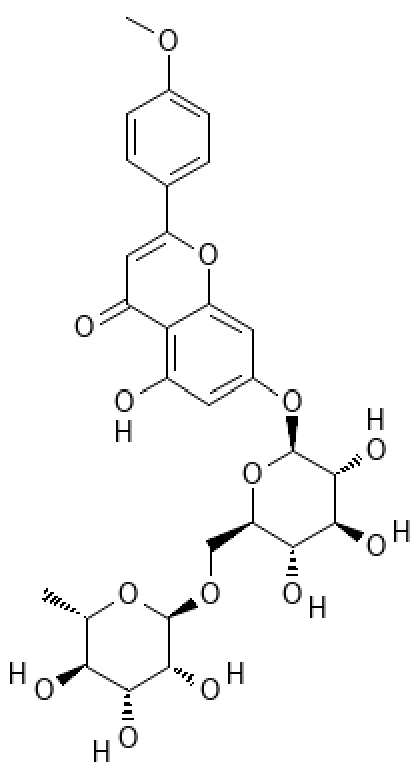
F) Apigenin



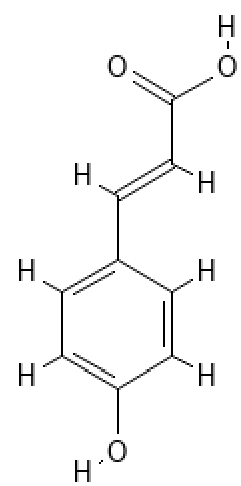
G) Citronellol



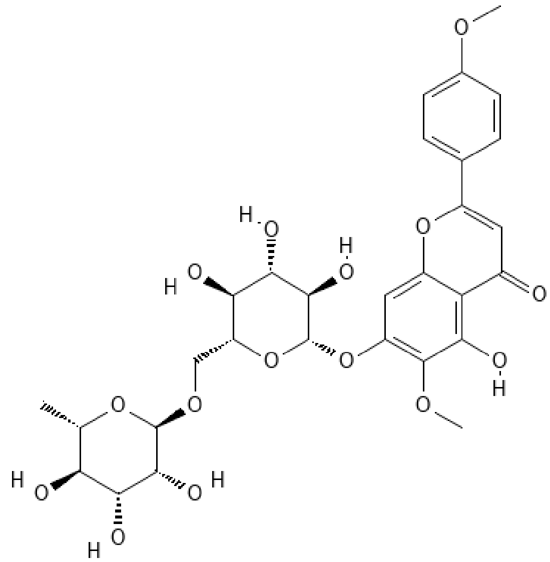
H) Fumaric Acid



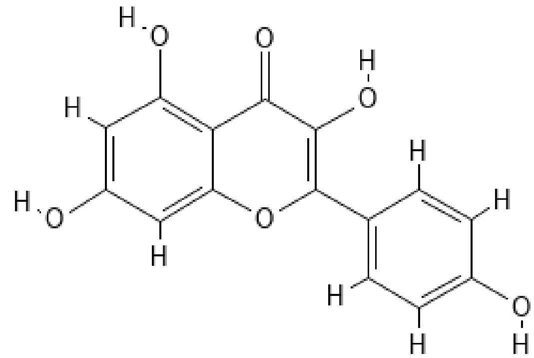
I) Linarin



J) Coumaric Acid



K) Pectolinarin



L) Kaempferol

Figure 3 (A-L): Chemical structure of major bioactive compounds identified in the genus *Cirsium.* Chemical structures were prepared by the author using ChemDraw software.

Pharmacological activities

All medicinal plants show some less or more pharmacological activities (Sharma et al., 2024c; 2024d). *Cirsium* contains a wide variety of phytochemicals that contribute to its rich pharmacological activity. Numerous biological characteristics, including antibacterial, analgesic, hepatoprotective, antioxidant, anti-inflammatory, and anticancer qualities, have been documented thus far from the various species of *Cirsium*.

Antimicrobial activity: *E. coli, B. subtilis, P.acruginosa, Klebsiella pnenumoniae, Micrococcus, S. aureus and C. albicans* were among bacterial species against which Nazaruk and Jakoniuk investigated the microbicidal potential of *Cirsium rivulare's* flowers and leaves. It was discovered that every extract from *Cirsium rivulare* had antiproliferative and bactericidal qualities. However, it was discovered that *Cirsium* leaf water extract was more efficient against Gram-positive bacteria (Nazaruk et al., 2005). A variety of bacterial species were used to evaluate the antibacterial activity of five substances produced from *Cirsium arvense: tracin, hispidulin, luteolin, 9,12,15-octadecatrienoic acid, and α-tocopherol.* These have shown significant protective efficacy against bacterial strains. Octadecatrienoic acid, however, exhibited minimal bactericidal activity. All of the phytocompounds were shown to have moderate to low antifungal activity, with the exception of Octadecatrienoic acid, which had no antifungal activity (Khan et al., 2013). Compared to the leaf extract, the *Cirsium* species flower extract had a stronger antibacterial action. Furthermore, *C. oleraceum's* flavonoids exhibit strong antibacterial and antifungal properties (Strawa et al., 2016).

Antioxidant Activity: Numerous in vitro tests revealed that *C. arvense's* roots, leaves, and flowers exhibited a strong antioxidant effect (Demirtas et al., 2016). The ethanol extract of *C. arvense* was found to exhibit strong antioxidant properties. Nazaruk investigated antioxidant capacity of many extracts from *C. arvense, C. oleraceum, C. palustre, C. rivulare, and C. vulgare* (Hossain et al., 2016). The ABTS technique was used to measure the total antioxidant potential of crude aqueous extracts of *Cirsium* species. According to a different study, luteolin and silibinin are the main antioxidant components of *Cirsium* japonicum. Additionally, luteolin, apigenin, and their glucosides, which are found in many *Cirsium* species, have shown hepatoprotective and antioxidant properties. Furthermore, *Cirsium*'s main flavonoids, pectolinarin and pectolinarigenin, had significant antioxidant activity (Lee et al., 2008). In a different investigation, it was shown that various species of *Cirsium* contained silicristin, apigenin, and diosmetin in considerable concentrations. These compounds also demonstrated strong DPPH radical-scavenging capabilities (Jung et al., 2017).

Antiproliferative Activity: Chloroform and methanol extracts of *C. arvense* were studied on HeLa cells (mammalian uterine carcinoma), Vero cells and C6 cells (rat brain tumour cells) to investigate the antiproliferative capacity of the extracts. *C. arvense* root extracts showed maximum inhibitory effects with regard to C6 cell proliferation. Conversely, the extracts of the stems had a strong inhibitory effect on the HeLa and Vero cell lines. The antiproliferative phytochemicals extracted from *C. arvense* were Arvense 1, Stigmasterol, Linarin and Daucosterin of the plant (Demirtas et al.,2016). The mammalian colon cancer cells were most selectively inhibited by Tocospiro C and B, with respective IC50 values of 0.03

μM and 0.12 μM. Tocospiro A, on the other hand, showed very little inhibitory effect against HCT-8 cells; its IC50 was 12.8 μM (Sahli et al.,2017).

Anti-inflammatory and Analgesic activity: Pectolinarin, the active component of *C. subcoriaceum*, was found in aqueous extracts from its aerial portion. In mice, pectolinarin and crude extract of *C. subcoriaceum* inhibited the writhing caused by acid in a concentration-dependent manner (Martínez et al., 1998). At a comparable concentration, pectolinarin was found to exhibit comparable protective efficacy to acetylsalicylic acid, a common analgesic chemical. Carrageenan-induced oedema was inhibited by pectolinarin and *C. subcoriaceum* water extract (Lim et al., 2008). Additionally, in the animal control group, oral treatment with pectolinarigenin and pectolinarin reduced inflammation and allergies. It suppressed generation of NO, interleukin-6, and tumour necrosis factor-α in lipopolysaccharide-induced macrophage cells (Kim et al., 2013). In a similar vein, silibinin extracted from *C. japonicum* suppressed the growth of human mast cells and decreased the expression of pro-inflammatory cytokines (Zhao et al.,2018).

Hepatoprotective activity: Flavonoids extracted from *Cirsium japonicum DC* have demonstrated hepatoprotective effects against hepatotoxicity, comparable to or even surpassing the effects of silymarin, a well-known hepatoprotective agent (Ma et al.,2016). The promise of *C. japonicum* as a natural treatment for liver problems is highlighted by this protective activity (Ma et al.,2016). Abundance of these active compounds in *Cirsium japonicum* underscores its traditional use and scientific validation for liver support (Zhao et al., 2017). Hepatitis B surface antigen expression was reduced, and hepatocellular carcinoma cells were protected from tacrine-induced hepatotoxicity by the roots and leaves of *C. arisanense* (Ku et al.,2008). Histological studies validated the biochemical study and indicated that the *C. setidens* extract significantly inhibited the degeneration of hepatic ballooning (Zhao et al., 2017; Lee et al.,2002).

Anticancer Activity: As noted, *Cirsium japonicum* exhibits antitumor effects (Zhao et al., 2017). The broader genus *Cirsium* is reported to possess compounds with potential anticancer properties (Aggarwal et al., 2022). However, detailed specific mechanisms or extensive clinical data on anticancer activity for the specific species like *C. arvense*, *C. wallichii*, *C. vulgare*, *C. heterophyllum*, or *C. nishiokae* are not explicitly provided within the scope of these source materials. The general phytochemical composition, including flavonoids and lignans, suggests a basis for further investigation into their anticancer potential. *Cirsium* has been shown in various studies to be anti-cancer and to have a good therapeutic potential for preventing cancer. The anticancer properties of pectolinarin and 5,7-Dihydroxy-6,4-dimethoxyflavone, which were separated from *C. japonicum*, were tested in mice (Liu et al.,2006). Additionally, *C. japonicum* extract displayed an antiproliferative influence on MCF-7 cancer cells by modulating mitochondrial apoptotic pathways and suppressing the cell cycle in the G1 phase (Kim et al., 2010). While 3β-Hydroxy-22-oxo-20-dandelion-30-oleic acid showed a high selective suppression on the ovarian tumor cell line A2780, the triterpenes in *Cirsium* setosum exhibited modest cytotoxicity against human colon and ovarian cancer cells (Aggarwal et al., 2022).

Immunomodulatory Activity: The anti-inflammatory and antioxidant activities observed in *Cirsium japonicum* can indirectly contribute to immune system regulation by reducing oxidative stress and inflammation, which are key modulators of immune responses (Shin et al., 2017; Kim et al., 2024). Pectolinarin, a phytoconstituent of *C. japonicum,* improved humoral and cellular immune responses while inhibiting the formation of malignancies in mice. In the tumour-bearing animals, it increased the complement pathway and improved splenic cell transformation and natural killer cell activity (Shin et al., 2017).

Conclusion and Future Direction:

The genus *Cirsium* is a very diverse and medicinally important group of plants under the family Asteraceae, and traditional healthcare systems in various parts of the world. Many species have been used for treating inflammatory conditions, wounds, hepatic diseases, gastrointestinal diseases and other health issues. Numerous bioactive components have been identified by phytochemical studies, including flavonoids, phenolic acids, lignans, terpenoids, and sesquiterpene lactones, which have a variety of pharmacological properties, including anti-inflammatory, antioxidant, antimicrobial, hepatoprotective, anticancer, and wound-healing etc. The results indicate that the genus has ethnomedicinal significance and it may be a rich source of natural products for further therapeutic research. These attractive characteristics do not help to even the distribution of scientific knowledge on the genus. Although a few species have been studied in great depth, other species, especially those found in geographically limited habitats such as the Himalayan regions, are poorly known in terms of their phytochemistry, pharmacology, molecular biology, and ecological relevance. There is a need for a uniform and comprehensive research method due to the lack of detail in the studies and the different methods used in them. Cirsium species are also important for their ecological value, providing food for pollinators such as bees and butterflies, which play a critical role in maintaining the stability and biodiversity of ecosystems. Therefore, phytochemistry and pharmacology, ecology, conservation biology and sustainable utilization strategies are vital components of a multidisciplinary approach to make the fullest use of the genus Cirsium for its therapeutic and ecological value. These activities will not only aid in the development of NPR and phytopharmaceuticals, but also conservation and sustainable management of the valuable plant resource.

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Author contributions

Concept and study design: Dr. Harsharan Singh
Data collection: Anamika Sharma
Manuscript drafting: Dr. Harsharan Singh, Anamika Sharma, Madhvi Negi, Ria.
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