UDC 632.727 ***DOI 10.52578/2305-9397-2024-3-2-28-38***
IRSTI 68.37.05; 68.37.29

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SOW THISTLE (SONCHUS OLERACEUS L) PLANTS GROWTH AND CHEMICAL COMPOSITION FROM THE ABOVEGROUND PART IN KAZAKISTAN

ANNOTATION

Kazakhstan's plenty of geographic climates offer an ideal environment for the development and research of thistle medicinal plant species, which are abundant in bioactive chemicals. The identification and measurement of important substances such as amino acids, fatty acids, and vitamins were highlighted in this study, which focuses on the chemical composition of the Sow thistle (Sonchus Oleraceus L.) plant in Kazakhstan. Medicinal plants, as is well-known, have long been acknowledged for their therapeutic features, providing a natural substitute for manufactured medications that may have less negative effects. Utilizing advanced physicochemical methodologies and chromatographic techniques, the study effort aims to clarify the possible medicinal uses of this particular plant species. The State Pharmacopoeia of the USSR and previous phytochemical studies established methodologies, standards and underscored the rigor and reliability of the analytical approach. The findings of this study contribute to the growing body of knowledge on the bioactive constituents of Sow thistle medicinal plants in Kazakistan, highlighting their pharmacological significance and potential for drug discovery. By harnessing the chemical diversity of Kazakhstan's flora, researchers can unlock new opportunities for the development of pharmaceuticals, nutraceuticals, and other health-promoting products derived from natural sources.

Key words: *Sow thistle (Sonchus Oleraceus L), chromatogram, surfactant, spectrophotometry, qualitative analysis, quantitative analysis.*

Introduction. Since ancient times, medicinal plants have been a major source of therapeutic compounds, providing artificial medications with a natural alternative and often more sustainable substitute. These plants are valuable resources for a variety of industries, including food and pharmaceuticals, because of their chemical composition, which is a major factor in their therapeutic qualities. Hendawy et al. (2019) conducted a comprehensive survey of winter weeds affecting medicinal plants in Egypt, identifying key weed species and their impacts on crop yield and quality. The study emphasized the necessity of integrated weed management strategies, including crop rotation, mechanical weeding, and the use of herbicides, to mitigate losses and ensure the sustainable cultivation of medicinal plants in the region. The findings highlighted significant economic and ecological impacts of weed infestations on medicinal plant cultivation, underscoring the need for policy interventions and farmer education programs to adopt integrated weed management practices [1]. Peschken et al. (1983) investigated yield reductions in rapeseed caused by perennial sowthistle (Sonchus arvensis) in Saskatchewan and Manitoba. The study revealed substantial economic losses due to weed competition, emphasizing the importance of effective weed control measures such as timely herbicide applications and improved cultural practices to enhance rapeseed productivity in

Western Canada. The authors called for continued research and extension services to assist farmers in implementing effective weed management strategies [2]. Zollinger (1989) provided a detailed analysis of the distribution, biology, and control strategies for perennial sowthistle in Michigan. The study underscored the necessity of integrated pest management approaches that incorporate cultural, biological, and chemical control methods to manage this invasive weed species effectively in agricultural settings. Zollinger emphasized early detection and consistent monitoring to prevent the spread of perennial sowthistle and recommended developing regional management plans tailored to specific agricultural practices and environmental conditions [3]. Morozova (2023) documented the presence and impacts of archaeophytes in the flora of European Russia, highlighting the ecological implications of invasive plant species. The study called for enhanced monitoring and management efforts to mitigate the negative effects of these species on native biodiversity and ecosystem stability. Morozova's research stressed the importance of understanding ecological interactions between archaeophytes and native species and recommended targeted conservation efforts and public awareness campaigns to protect native flora [4]. Abbasi et al. (2015) explored the ethnobotanical aspects of wild edible vegetables in the Lesser Himalayas, focusing on their nutritional value and cultural significance. The research underscored the importance of these vegetables as traditional food sources and advocated for their sustainable utilization and conservation to support local livelihoods and biodiversity conservation efforts. The authors recommended integrating wild edible vegetables into local diets and agricultural systems to enhance food security and promote sustainable land-use practices [5]. Madanan et al. (2021) assessed the phytoremediation potential of Chloris barbata Sw. in roadside environments contaminated with heavy metals. Their findings highlighted the efficacy of Chloris barbata Sw. in mitigating environmental pollution and reducing risks associated with heavy metal accumulation in the food chain. The study advocated for the use of Chloris barbata Sw. in phytoremediation programs and recommended further research to optimize its application in various environmental contexts, promoting environmental sustainability and public health [6]. Malik et al. (2021) reviewed medicinal plants used for hypertension treatment, emphasizing their pharmacological properties and potential as alternative therapies. The study highlighted the significance of medicinal plants in traditional medicine and suggested their integration into mainstream healthcare systems for managing hypertension and other prevalent health conditions. The authors recommended rigorous clinical trials and standardization of herbal formulations to ensure safety and efficacy, along with policies to support the cultivation and sustainable use of medicinal plants [7]. YI et al. (2015) cataloged major introduced economic plants in China, providing insights into their cultivation, economic importance, and ecological impacts. The research emphasized the role of these introduced species in supporting agricultural productivity and economic development while highlighting the need for sustainable management practices to minimize potential environmental risks. The study suggested implementing best practices for the introduction and management of economic plants, including risk assessments and monitoring programs to prevent invasive species outbreaks [8]. Asaduzzaman et al. (2023) investigated the germination ecology and growth phenology of cowvine (Ipomoea lonchophylla), focusing on environmental factors influencing its invasive potential. Their findings provided valuable information for developing effective management strategies to control the spread of cowvine and mitigate its impact on agricultural and natural ecosystems. The study recommended integrated weed management approaches, including mechanical removal, herbicide application, and the use of cover crops to suppress cowvine growth [9]. Littlefield et al. (2000) proposed the introduction of the Chondrilla root moth (Bradyrrhoa gilveolella) as a biological control agent for rush skeletonweed in North America. The study advocated for sustainable weed management practices using biological control methods to reduce reliance on chemical herbicides and promote long-term weed control strategies. The authors recommended rigorous ecological assessments and pilot programs to evaluate the effectiveness and potential non-target impacts of biological control agents before widespread implementation [10]. Thill and Lemerle (2001) reviewed global issues related to herbicide resistance in wheat production systems, underscoring the growing challenge of herbicide-resistant weeds. Their analysis emphasized the importance of integrated weed management approaches that combine cultural practices, herbicide rotation, and alternative control methods to sustainably manage weed populations and preserve herbicide efficacy. The study called for international collaboration in

research and policy development to address herbicide resistance and promote sustainable agricultural practices [11]. Kazakhstan, with its diverse territorial zones and rich biodiversity, presents a promising landscape for the cultivation and study of medicinal plants. The study of plant phytochemicals, such as fatty acids, amino acids, tannins, and vitamins, provides valuable insights into the bioactive compounds present in these plants. Research efforts, such as those by Miftakhova and Muzychkina, have focused on phytochemical analyses and the detection of biological activities in plant substances, shedding light on the potential therapeutic benefits of these natural compounds [12]. Methods such as chromatography, as described by Bolotnikov and Schreiber, have been instrumental in identifying and quantifying specific compounds in plant materials. The State Pharmacopoeia of the USSR and other references have provided standardized protocols for the analysis of plant components, ensuring consistency and accuracy in research findings [13]. The chemical composition of medicinal plants, as explored by researchers like Pleshkov and Goryaeva, encompasses a wide range of bioactive molecules with diverse pharmacological properties. From fatty acids to vitamins like ascorbic acid, these compounds contribute to the therapeutic potential of medicinal plants [14, 15]. Furthermore, the presence of alkaloids, phenolic compounds, and other bioactive substances in plants, as studied by researchers like Raffaus and Khazbievich, highlights the complexity and diversity of phytochemical profiles. These compounds not only offer medicinal benefits but also serve as valuable resources for drug discovery and development [13].

In considering this, the current study aims to discover and quantify important chemicals such amino acids, fatty acids, and vitamins by examining the chemical composition of the Sonchus Oleraceus L. plant in Kazakhstan. Through the use of advanced physicochemical techniques, the study seeks to offer insightful information about the possible therapeutic applications of this plant species. When everything is considered, there exists a lot of potential for developing new medications, nutraceuticals, and other health-promoting items from the investigation of the chemical composition of medicinal plants in Kazakhstan. Through the utilization of advanced analytical techniques and the region's abundant biodiversity, scientists may fully explore the potential benefits of these natural resources for human well-being and health.

Materials and methods of research. We used chromatographic specialized technique to look at the chemical composition of the Sonchus Oleraceus L. plant in Kazakhstan. The plant's above-ground parts, such as its stems, leaves, and flowers, were chosen as the main focus of the study. Quantitative determinations of the plant raw materials were conducted following state standards. The extraction process involved using 50% alcohol and water solutions to obtain the plant's bioactive compounds. And for qualitative analysis, chromatography methods, including paper chromatography, were utilized to separate amino acids, alkaloids, flavonoids, vitamins, and carbohydrates present in the plant material. Physicochemical methods were then applied for quantitative determinations of these compounds. Amino acids were determined by extracting the plant material in different solutions (acetone, alcohol, boiling water, distilled water) and subjecting the extracts to chromatography. The presence of vitamins B1, B2, C, and other compounds was qualitatively assessed using specific reagents. Furthermore, heavy metal analysis was conducted to ensure the safety of the plant material for human use. The results indicated that the plant contained beneficial compounds such as amino acids, proteins, phenolic acids, fatty acids, and vitamins, with no harmful levels of heavy metals detected.

Sow thistle (Latin: Sonchus OleraceusL.) is an annual herbaceous plant of the Asteraceae family (Asteraceae). Milk thistle (Sonchus Oleraceus) is a plant that grows only in the wild, not having the status of a weed. Sonchus Oleraceus (milk thistle) is a plant belonging to the thistle family [16]. An organism is considered a weed when it grows in a place where people seem to dislike it because it gets in the way of their needs, wants, or interests. Weeds are plants with nature that make them hazardous, noticeable, difficult to control in controlled environments, or just plain unpleasant in grassy areas, parks, fields, gardens, and apple orchards as well as in residential and commercial areas. Specifically, weeds have evolved to flourish in human environments like that of purposefully planted plants [16, 17]. The group of true weeds includes several biologically interesting plants that are closely related to human cultivated land, gardens and fields. These weeds are closely related to cultivated plants planted by humans. Such plants are identical to their complete disappearance in nature. True weeds grow side

by side with human planted plants and are part of the flora of cultivated plants. These weeds are quite adapted to the specific conditions of the cultivated land; from which they cannot escape separately. As a rule, true weeds die out because they are not adapted to the conditions of the natural phytocenosis [18]. Garden thistle or sow thistle (Sonchus Oleraceus L.) translates from Latin as "garden thistle" because it is used for food. An annual plant with a height of (25-100 cm). The stem is often branched. The leaves are serrated, lyre-shaped pinnate, prickly with a large heart-shaped triangular apical lobe significantly exceeding the lateral ones. It has milky juice. The light yellow flowers are collected in inflorescences-baskets. Sow thistle (Sonchus Oleraceus L.) blooms from June to September [16, 18].Sow thistle is a very common weed of the family of compound flowers. It resembles a dandelion in appearance. The plant Siam weed (Chromolaena odorata) which is a perennial plant with a long stem, up to 100 cm in height, branched at the top and known for its medicinal properties. The leaves are sessile, narrowed to the base, toothed or lobed. The flowers are tubular, lilac, unisexual, the inflorescences are a basket. Achenes are small, glabrous, with a fly of feathery hairs. The plant is a big problem for crops, as a weed, propagating both by seeds and vegetative [16, 17]. The plant is found everywhere. There are wide range of different species of Sow thistle as shown in (Table 1) such as 70 species known in Africa and Eurasia, and it is ubiquitous as a weevil. In the CIS countries there are 6 species, including 5 weeds. The most harmful of them is the plough thistle (Sonchus Oleraceus) (S. arvensis). It is considered a pest of grain and cultivated plants. Sow thistle (Sonchus Oleraceus) and ragged thistle (Sonchus Oleraceus) are good fodder for livestock, especially pigs [19].

Table 1 – Common types of Sow thistle (Sonchus Oleraceus) species

Russian name	Latin name	Spreading of roots, cm	Yield, thousand units	Seed growth, years	References
Sow thistle	Sonchus olerauces L.	10-12	15-20	4	[5]
Field thistle (yellow)	Sonchus arvensis	50	20	5	[8]
Pink thistle (bodyak)	Cirsium arvense	15-35	36,0	3-4	[8]
Blue thistle (Molokan)	Mulgedium tataricum	100	0,5-2,0	5-4	[4]

Bodyak or yellow thistle is another name for sow thistle. It is also known by a variety of popular names, such as milky tassel, milk thistle, smooth thistle, annual sow thistle, hare's colwort, and soft thistle. Sonchus oleraceus is a member of the Cichorieae tribe within the Asteraceae family. These species are native to Western Asia and Europe. Only four species of sow thistle plants are found in our country's forests [13,16].

- Garden (sow thistle), *Sonchus olerauces L.*
- Seva(field sow thistle), *Sonchus arven*
- Scarlet (bodyak), *Cirsium arvense*
- Hard (sow thistle hard)

The annual herbaceous plant known as garden sow thistle, or Sonchus oleraceus L., has a white, juicy, glabrous stem. The hollow, straight stem of this annual plant can reach heights of 30 to 100 centimeters (12 to 39 in). It can withstand most soil types and prefers full sun. The hermaphrodite flowers tend to be fed by flies and bees [1, 5]. Seeds carried by the wind or water help it spread. The flower is yellow; the inflorescences are pediculate. The stem is thinly branched, up to 1m. The underside of the leaf is large, the edges are serrated, the middle and upper ones are sessile. Yellow flowers are collected in (5-15) baskets. It grows in the garden, in the vegetable garden, in the field on the banks of various reservoirs on the river bank (figure a, b).

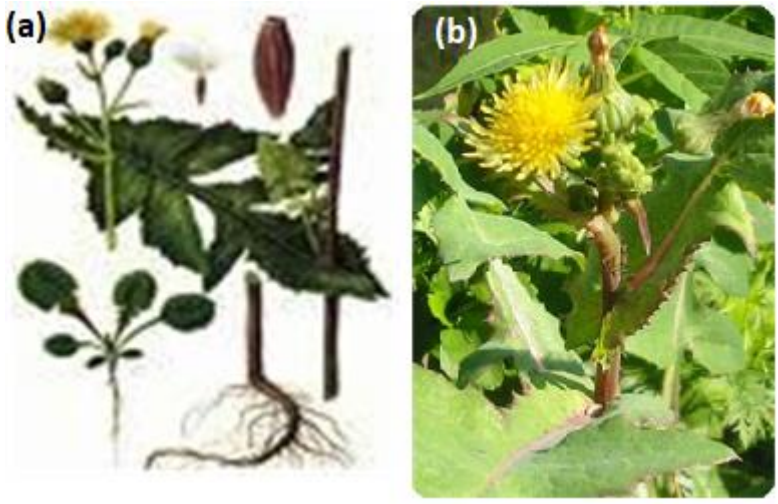


Figure 1 – (a) *General view* of the plant Sonchus oleraceus L. (b) *Aboveground part* of the plant Sonchus oleraceus L.

The grain will be crumbly. Seeds, through root shoots, are propagated by stem shoots with a sufficient amount of moisture. Ripe grains fly up into the air and germinate, penetrating the soil. One plant produces up to 15 thousand grains. Sow thistle grows well in dry, highly nutritious soil. Grass is harvested in July–September, and young leave in May- June. It is well eaten not only by humans but also by rabbits, geese, and all domestic animals, especially sheep. Just appeared buds and non-flowering branches are well weathered. After flowering in mostly in July, the plant should be used after treatment with warm water before use. Sow Thistle's white milky juice will be sour, similar to witch hazel juice. The use of this plant is similar [16, 19].

Results and their discussion. Sonchus oleraceus L. plant is a real food for diabetics. The chemical composition has not been fully studied. And the composition of the plant depends on the place where it grows. It is known that only the leaves contain 47% mg of vitamin C, 0.9% carbohydrates, and 4.6% protein. The raw material contains carotene (provitamin A) and minerals. One interesting fact is that Sonchus oleraceus L plant is not affected by the soil, it grows in all climatic zones and gives a high yield and in Indonesia this plant is grown culturally [19]. Proteins are the most important of the substances found in all living organisms, and they are a major part of the cell's protoplasm. Protein substances are formed in the plant [4, 8]. For this purpose, nitrogen compounds in the soil are used. And legumes can produce protein by using nitrogen in the air. The animal world and humans synthesize protein from amino acids and other nitrogen-containing organic substances [16, 21]. They get such substances from plants and other animals, which they use for food. The simplest protein composition includes the following elements (calculated as%): carbon 50-54; oxygen 21.5-23.5; hydrogen 6.5-7.3; nitrogen 150-17. 6; sulfur 0.3-2.5. Some individual proteins also contain small amounts of iron, phosphorus, zinc, cobalt, manganese, molybdenum, iodine, copper, and other elements [15, 20]. The nitrogen content of proteins is stable and averages 16 percent of all elements by dry weight. Therefore, to determine the amount of protein in a particular biological material, determining the amount of nitrogen in it, it multiplies the value by the number 6,25(100:16=6,25) [12, 22]. The trace elements contained in the Garden sow thistle plant were determined by the method of emission spectral analysis (using a DFS–13 spectrograph). Garden plant sow thistle is distinguished by its composition, which includes vitamins, alkaloids, proteins, amino acids, especially trace elements: iron, potassium, calcium, magnesium, sodium, phosphorus, manganese, chlorine, zinc. Many trace elements affect blood circulation in the body, protein, salt metabolism and activation of enzymes, the general process of metabolism. Trace elements have a certain physiological effect, if they are not enough in the body, which leads to the occurrence of certain diseases. Quantitative determination of trace elements contained in the melon residue was carried out by the method of emission spectral analysis on a DFS-13 spectrograph. The resulting 300 mg of plant ash is vaporized in a (DC Spark I-16. 2100-3600A) is photographed in zone 0. The reference is determined on the basis of silicon. The sensitivity of the analysis is (10^{-2}-10^{-5}) %. Result of determination of standard copper sludge (SHM-M TCO 2962 – 84). The result of the obtained trace elements is presented in (Table 2).

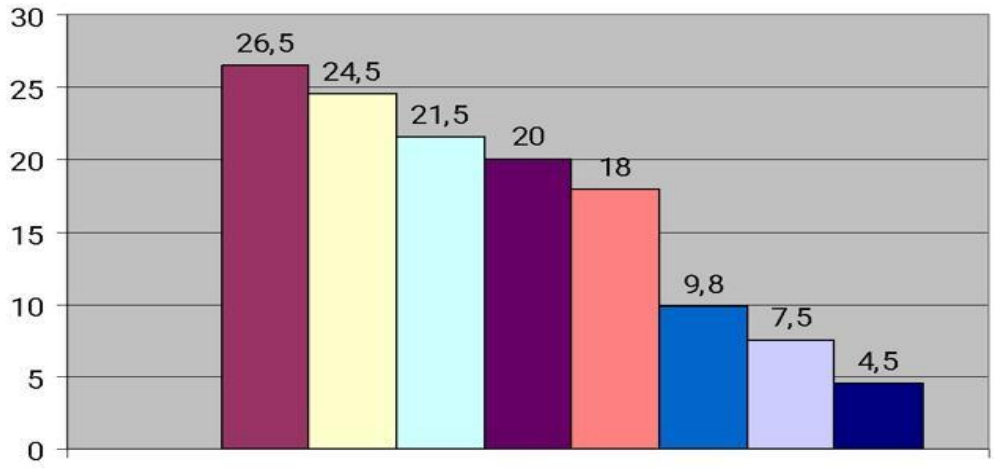
Table 2 – Microelement composition of Sonchus Oleraceus L. (sow thistle) plant

Element:	Zn	Mn	Ca	Mg	K	P	CI	Na
mg:	3,4	7,6	210	80	820	70	50	12

Medicinal plant extractives mean the quantitatively determined dry residue obtained by dissolving organic and inorganic substances from plant raw materials with appropriate solvents. The presence of extractive substances in medicinal plant raw materials is an important quantitative indicator describing its good quality. Depending on the chemical composition of plant raw materials and the solvent used, the chemical substances contained in it are separated by means of a solvent. To determine the extractivity of a given substance, a suitable solvent specified in NTD is taken. This solvent is used to make an extract or concentrate of that raw material. Most often it is ethyl alcohol (40 or 70%) or water. To determine the extractivity of the above-ground part of the plant in different solutions, we took solutions in two different alcohols, acetone, chloroform, benzene, ethyl acetate and water. Extractivity results are shown in (Table 3) and (Diagram 1).

Table 3 – The attractiveness of the above-ground part of the Sonchus Oleraceus (sow thistle) plant

№	Solutions	Raw material weight, g	Solvent volume, ml	separated substance,mass g	separated substance, %
1	50% alcohol	2	25	0,53	26,5
2	DW	2	25	0,49	24,5
3	Aqueous acetone	2	25	0,43	21,5
4	Benzene	2	25	0,4	20
5	Acetone	2	25	0,36	18
6	90% alcohol	2	25	0,20	9,8
7	Chloroform	2	25	0,15	7,5
8	Ethyl acetate	2	25	0,08	4,5



Dark purple - alcohol
Yellow - hot DW
Light blue - aqueous acetone
Dark violet - benzene
Orange - acetone
Blue - 90% alcohol
Light violet - chloroform
Ink blue - ethyl acetate

Figure 2 – Extractavity of the Sonchus Oleraceus L. plant in different solutions

As considered in the (Table 3) the extractivities of 50% alcohol and water are higher than others. That is, the extractivities of these solutions are used for further research. The paper chromatography results are shown in (Tables 4). As a result of chromatography, it was determined that there are 2 amino acid substances in distilled water, one in aqueous acetone, two in 50% alcohol, one

in hot alcohol, two in 90% alcohol, and two in water.

According to the above-mentioned method, amino acids were chromatographed, comparing them with qualitatively known amino acids. As a result, as can be seen from (Table 4, 3) amino acids were separated in aqueous acetone (valine, threonine, glycine, arginine); 5 (phenylalanine, methionine, threonine, glycine, lysine) in 50% alcohol; 4 (valine, tryptophan, threonine, glycine) in 90% alcohol; 2 (threonine, glycine) in hot alcohol; It was found that hot water contains 3 (phenylalanine, threonine).

Table 4 – Results of comparative paper chromatography of amino acids

Amino acids	Rf	Ningiridine
1	2	3
DL- lysine	0,353	Light purple
Glycine	0,443	Purple
L- arginine	0,330	Ink blue
Threonine	0,533	Purple
Valine	0,684	Ink blue
Phenyl analine	0,737	Ink blue
Isoleucine	0,744	Light purple
Tryptophan	0,612	Light purple
Destilled water	0,532	Light purple
Aqueous aceton	0,686 0,532 0,430 0,321	Purple Dark purple Dark purple Ink blue
50% alcohol	0,714 0,65 0,535 0,442 0,3	Pink Purple Purple Dark purple Ink blue
90% alcohol	0,697 0,640 0,528 0,422	Light purple Purple Dark purple Dark purple
Boiling alcohol	0,540 0,430	Light purple Purple
Boiling water	0,737 0,547 0,291	Light purple Purple Ink blue

Furthermore, radial chromatography method, which is often used in the qualitative determination of amino acids. Is shown in (Table 5).

Table 5 – Results of determination of amino acids by radial chromatographic method

System	Extraction	R_f	Defining	Color
1	2	3	4	5
Saturated solution of phenol in water	DW	0,2647 0,6176 0,9117	Ninhydrin	Purple Light purple Brown purple
-	Aqueous aceton	0,2121 0,6363	-	Brown purple Light purple
-	50% alcohol	0,7059 0,4117 0,1764	-	Light purple Dark purple

1	2	3	4	5
-	Hot alcohol	0,1764 0,4411 0,7059 0,9117	-	Light purple Purple Dark purple Brown purple
-	90% alcohol	0,2059 0,4117 0,7647 0,9411	-	Purple Light purple Purplr Brown purple
-	Hot water	0,3684 0,7368	-	Pale purple Dark purple

The composition of fatty acids (higher carboxylic acids) of the above-ground part of the Sonchus Oleraceus L. Plant was found by gas chromatography "Carlo-Erba-4200" (USA, Italy). For the analysis Chromatography special conditions were used such as Injector temperature - 188$_o$C, the temperature of the detector is 230^{o}C, the temperature of the oven is 188$_o$C and the Analysis time was one hour. For this analysis, the crushed raw material is extracted with a mixture of chloroform and methanol (2:1) for 5 minutes. The extract is filtered through a paper filter and concentrated. After that, the obtained extract is methylated with 10 ml of methanol, 2-3 drops of chloroacetyl and 60-70^{o}C in a special system for 30 minutes. Methanol is concentrated using a rotary evaporator, and the samples are extracted with 5 ml of hexane and injected into the gas chromatograph.

Table 6 – Fatty acid composition of Sonchus Oleraceus L. plant.

Fatty acids	Symbols	Composition, %
		Sonchus OleraceusL.
Miristin	$C_{14:0}$	3,2
Pentadecane	$C_{15:0}$	7
Palmitine	$C_{16:0}$	16,5
Palmitolein	$C_{16:1}$	2,8
Stearin	$C_{18:0}$	9,2
Olein	$C_{18:1}$	35
Linol	$C_{18:2}$	24,5
Linolene	$C_{18:3}$	1,5

Garden sow thistle is used in folk medicine. To do this, the aboveground part of the specified plant is collected during the flowering period and dried. The Garden sow thistle plant has diuretic, lactogenic, hemostatic properties (especially in bloody sputum) and has an anti-inflammatory effect. It is used as a medicine for intestinal worms. White milk of the plant was used in folk medicine for liver diseases, and all the organs of the plant *for gout and hemorrhoids*. Crushed young leaves are pressed to the operated wound. Young leaves (previously placed in water) are part of the healing salad. Garden sow thistle is used as a medicinal plant with choleretic, diuretic and anti-inflammatory effects. Water tincture of Garden sow thistle is used as a milk multiplier for inflammation of the intestines of internal organs (stomach, lungs, liver), jaundice, hemorrhoids, chest diseases, in nursing women. Freshly brewed grass is used for steaming painful areas. In folk medicine, melon cabbage is used for jaundice, hemorrhoids, kidney diseases, spitting blood, treating intestinal worms, pumping bile and anti-inflammatory treatment. Water decoction of Garden sow thistle is used for inflammation of the stomach, intestines, liver, lungs, jaundice and hemorrhoids. Freshly picked and boiled herbs are used to treat sore throats, chronic gastroenteritis. The vegetative mass of Garden sow thistle is used in the treatment of bone-vascular tuberculosis, malarial diseases, ascites, epigastric diseases, and as a treatment for bedbugs. In Chinese medicine, the root is used to stop bleeding, and herbs - as a laxative, tonic, and vitamin substance. The leaf juice is mixed with egg yolk and used in the treatment of breast cancer. Since time immemorial, arable grass has been considered a medicinal herb. Tincture and decoction regulate metabolic processes in the human body, well help with headaches and neuroses.

This plant is used in the treatment of vascular diseases in the treatment of Yellow disease, as a choleretic agent, grass and Viburnum Root are used. Young leaves and twigs of sow thistle are used to make salad, vinaigrette, soup, and cabbage soup. To get a bitter taste, it is pre-soaked in salted water for (30-40) minutes. But the bitter taste does not disappear completely, giving the salad a special sour taste. Soup and schida bitter taste is not felt. Cooked leaves are added to soup, mashed potatoes, seasonings, fruit snacks and dough. Leaves mixed with rice powder are added to pancakes. After rinsing the leaves of garden viburnum with boiling water, young women in labor prepare a special dish to increase milk. The leaves are being prepared for winter. To do this, the leaves are collected and salted or dried in the first months of summer. Naturally, further detailed study of the chemical composition of water is necessary.

Conclusion. The chemical analysis of the Sonchus Oleraceus L. plant in Kazakhstan has revealed a rich composition of bioactive compounds, including amino acids, fatty acids, and vitamins, with potential therapeutic benefits. The presence of essential nutrients and phytochemicals underscores the plant's value as a source of natural remedies and pharmaceutical ingredients. The study's adherence to standardized methods and the absence of harmful heavy metals further enhance the plant's suitability for medicinal and industrial applications. These findings support the continued exploration and utilization of Kazakhstan's diverse flora for the development of novel healthcare products and pharmaceutical formulations. By leveraging the bioactive potential of medicinal plants, researchers can contribute to the advancement of natural medicine and sustainable healthcare practices. The results of this study serve as a foundation for future research endeavors aimed at harnessing the full therapeutic potential of medicinal plants in Kazakhstan and beyond.

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РЕЗЮМЕ

Разнообразие климатических условий Казахстана создает идеальную среду для развития и исследования лекарственных растений, таких как осот (Sonchus oleraceus L.), которые богаты биоактивными веществами. В данном исследовании, посвященном химическому составу осота в Казахстане, особое внимание уделено идентификации и количественному определению таких важных веществ, как аминокислоты, жирные кислоты и витамины. Лекарственные растения давно признаны за их терапевтические свойства, предоставляя натуральную альтернативу синтетическим медикаментам с меньшим количеством побочных эффектов. Используя передовые физико-химические методы и хроматографические техники, исследование

направлено на выяснение потенциальных лечебных применений данного вида растений. Методики и стандарты, установленные Государственной фармакопеей и предыдущими фитохимическими исследованиями, подчеркивают строгость и надежность аналитического подхода. Результаты данного исследования вносят значительный вклад в расширение знаний о биоактивных компонентах лекарственных растений осота в Казахстане, подчеркивая их фармакологическое значение и потенциал для открытия новых лекарственных средств. Используя химическое разнообразие флоры Казахстана, исследователи могут открыть новые возможности для разработки фармацевтических, нутрицевтических и других продуктов, способствующих здоровью, на основе природных источников.

ТҮЙІН

Қазақстанның климаттық жағдайларының алуан түрлілігі биоактивті заттарға бай ошаған (Sonchus oleraceus L.) сияқты дәрілік өсімдіктерді дамыту мен зерттеуге тамаша жағдай жасайды. Қазақстандағы ошағанның химиялық құрамы туралы бұл зерттеуде амин қышқылдары, май қышқылдары және витаминдер сияқты маңызды заттарды анықтауға және олардың мөлшерін анықтауға ерекше назар аударылады. Дәрілік өсімдіктер ежелден бері олардың емдік қасиеттерімен танылды, бұл синтетикалық препараттарға табиғи балама болып табылады және жанама әсерлері аз. Жетілдірілген физика-химиялық әдістерді және хроматографиялық әдістерді қолдана отырып, зерттеу осы өсімдік түрінің әлеуетті дәрілік қолдану мүмкіндіктерін анықтауға бағытталған. Мемлекеттік фармакопея белгілеген әдістер мен стандарттар және алдыңғы фитохимиялық зерттеулер аналитикалық тәсілдің қатаңдығы мен сенімділігін көрсетеді. Бұл зерттеудің нәтижелері Қазақстандағы ошағанның дәрілік өсімдіктерінің биоактивті компоненттері туралы білімді кеңейтуге елеулі үлес қосып, олардың фармакологиялық маңызын және жаңа дәрілік заттарды ашудағы әлеуетін көрсетеді. Қазақстан флорасының химиялық алуан түрлілігін пайдалана отырып, зерттеушілер табиғи көздерден фармацевтикалық, тағамдық және басқа да денсаулықты нығайтатын өнімдерді әзірлеу үшін жаңа мүмкіндіктер аша алады.

УДК 632.3.01/.08
МРНТИ 68.37.13

DOI 10.52578/2305-9397-2024-3-2-38-47

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