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DISTRIBUTION AND USE IN FOLK MEDICINE OF PLANTS OF THE GENUS YARROW (ACHILLEA L.)

Resume: This article presents an overview of the use in folk medicine of yarrow (*Achillea L.*) genus plants. The purpose of the review is to systematize and summarize the existing scientific data on the ethnopharmaceutical use and distribution of yarrow species.

Yarrow is a genus of herbaceous plants known for its medicinal properties and wide use in folk and contemporary medicine. The genus *Achillea*, one of the most famous genera of this Asteraceae family, has about 150 species growing throughout the northern hemisphere, 14 species of which are found on the territory of Kazakhstan. The data being reviewed show a wide range of uses for *Achillea* plants ranging from central nervous system diseases to gastrointestinal disorders. It is noted that only three Kazakh species of yarrow are known to be used in folk medicine: *A. filipendulina*, *A. millefolium*, *A. nobilis*. At the same time, only *A. filipendulina* has found application in local folk practice as a remedy for gastrointestinal diseases and as an abortive agent. According to this observation, it was accepted that the species of *A. filipendulina* is of significant scientific and practical interest as an object of research.

Keywords: *Achillea*, *Achillea filipendulina*, traditional medicine, biological activity, review.

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МЫҢЖАПЫРАҚ ТҰҚЫМДАС ӨСІМДІКТЕРДІҢ ТАРАЛУЫ ЖӘНЕ ХАЛЫҚ МЕДИЦИНАСЫНДА ҚОЛДАНЫЛУЫ (ACHILLEA L.)

Түйін: Бұл мақалада мыңжапырақ (*Achillea L.*) тұқымдас өсімдіктердің халықтық медицинасында қолданылуына шолу жасалады. Шолудың мақсаты – мыңжапырақ түрлерінің этнофармацевтикалық қолданылуы мен таралуы туралы бар ғылыми деректерді жүйелеу және қорытындылау.

Мыңжапырақ – дәрілік қасиеттерімен, халықтық және заманауи медицинада кеңінен қолданылуымен танымал шөптесін өсімдіктердің бір түрі. Asteraceae тұқымдасының ең танымал тұқымдастарының бірі – *Achillea* тұқымдасының Солтүстік жарты шарда өсетін 150-ге жуық түрі бар, олардың 14 түрі Қазақстан аумағында кездеседі.

Қарастырылған деректер *Achillea* тұқымдас өсімдіктерді қолда-

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РАСПРОСТРАНЕНИЕ И ПРИМЕНЕНИЕ В НАРОДНОЙ МЕДИЦИНЕ РАСТЕНИЙ РОДА ТЫСЯЧЕЛИСТНИК (ACHILLEA L.)

Резюме: Данная статья представляет обзор применения в народной медицине растений рода тысячелистник (*Achillea L.*). Цель обзора – систематизировать и суммировать существующие научные данные о этнофармацевтическом применении и распространении видов тысячелистника.

Тысячелистник – это род травянистых растений, известных своими лекарственными свойствами и широким применением в народной и современной медицине. Род *Achillea*, один из самых известных родов этого семейства Asteraceae, насчитывает около 150 видов, произрастающих по всему северному полушарию, 14 видов из которых встречаются на территории Казахстана.

нудың кең ауқымын көрсетеді – орталық жүйке жүйесінің ауруларынан асқазан-ішек жолдарының бұзылуына дейін. Халықтық медицинада мыңжапырақтың тек үш қазақстандық түрін қолдану туралы белгілі: *A. filipendulina*, *A. millefolium*, *A. nobilis*. Сонымен қатар, тек *A. filipendulina* жергілікті халықтық тәжірибеде асқазан-ішек ауруларына қарсы және түсік түсіруге арналған құрал ретінде қолданылды. Осы байқауға сәйкес, *A. filipendulina* түрі зерттеу нысаны ретінде айтарлықтай ғылыми және практикалық қызығушылық тудырады.

Түйінді сөздер: *Achillea*, *Achillea filipendulina*, халық медицинасы, биологиялық белсенділік, шолу.

Introduction. In pharmacy, there is a steady increase in interest in the segment of herbal medicines, which is due not only to the successful history of their use in medicine for many centuries, but also due to the rapid pace of development of their research and production. Despite the wide range of synthetic drugs, the use of phytopreparations is still relevant. The use of drugs based on medicinal plants, including as part of complex therapy, significantly expands the possibilities of treatment and allows achieving better clinical results. In addition, the World Health Organization (WHO) has a strategy to leverage the potential contribution of traditional medicine to health, well-being and people-centred health care. According to WHO experts, about 75% of patients can receive treatment using herbal preparations, and there are certain groups of patients (children, the elderly, pregnant women, nursing mothers) for whom the use of herbal preparations is appropriate [1].

In view of the wide range of applications and a long history of use in folk medicine around the world, plants of the genus yarrow (*Achillea* L.) are of significant scientific and practical interest among plants of the flora of Kazakhstan. Many species of yarrow have long been used as anti-inflammatory, antimicrobial, and antioxidant agents [2].
Materials and methods of research

The materials used in the review include scientific publications, articles, books and other sources containing information on the distribution, chemical composition and scope of plants of the yarrow genus. A systematic search of materials was carried out in such international databases as Web of science, PubMed, Google Scholar, ScienceDirect and other scientific resources. At the same time, the sources most cited and relevant in recent years were selected.

The review was carried out using methods of analysis, comparison and synthesis of research results presented in various sources. A critical evaluation of the scientific literature and the identification of the main trends, patterns and conclusions are used.

Research results and discussion

Обозреваемые данные показывают широкий спектр применения растений рода *Achillea* – от заболеваний центральной нервной системы до желудочно-кишечных расстройств. Отмечается, что известно о применении в народной медицине только трех казахстанских видов тысячелистников: *A. filipendulina*, *A. millefolium*, *A. nobilis*. При этом, лишь *A. filipendulina* нашел применение в местной народной практике, как средство при желудочно-кишечных заболеваниях и с abortивным действием. Согласно данному наблюдению было принято, что вид тысячелистник таволговый (*A. filipendulina*) представляет значительный научно-практический интерес в качестве объекта исследований.

Резюме: *Achillea*, *Achillea filipendulina*, народная медицина, биологическая активность, обзор.















The family Asteraceae includes a large number of flowering plants that belong to about 1600 genera and cover more than 23,000 species. The genus *Achillea* is one of the best known genera of this family. Currently, the genus *Achillea* L. includes about 150 species growing in Europe, North Africa, Western and Central Asia, and North America [3-4]. In the flora of Europe, there are 54 species of yarrow, in Eastern Europe - 26 species; in Türkiye - 40 species, in Central Asia - 10 species [5-6]. For the flora of Kazakhstan, S.A. Abdulina (1999) listed 8 species of the genus *Achillea*, while today 14 species of yarrow are known to grow in the country [7] (Table 1).

The use of yarrow genus plants in folk medicine
From an ethnopharmaceutical point of view, species belonging to the genus *Achillea* have long been widely prescribed as part of various folk medicines. Plants of this genus were widely used in the treatment of wounds of Greek soldiers, which is reflected in the name of the genus associated with the name of the mythical hero Achilles [9]. Literary sources are rich in data on various fields of application in traditional medicine of many species of yarrow. Most of the studies conducted on the characterization of the ethnopharmaceutical use of plants of the *Achillea* genus refer to the sources of the Middle East and some European countries [9-66] (Table 2).

The data being reviewed show a wide range of applications of *Achillea* plants in folk medicine, from diseases of the central nervous system to gastrointestinal disorders. Most often, yarrow preparations are used to treat abdominal pain, inflammation, problems of the gastrointestinal tract, hemorrhoids, high fever and for wound healing [9-11, 14-29, 47-49, 51-54, 57, 60, 63-65]. These plants are also known to be effective in supporting breastfeeding and regulating menstruation in women [42–43, 46].

The distribution of plants of the genus Yarrow in the ethnopharmaceutical sphere is due to the abundance in their composition of various secondary metabolites, which are associated with the pharmacological activities exhibited by *Achillea* preparations, such as antioxidant, antibacterial, antimicrobial, insecticidal, herbicidal, antifungal, anti-

Table 1 - Species of yarrow found on the territory of the Republic of Kazakhstan (RK)

No.	Name	Appearance	Ecology of distribution	Habitat on the territory of the Republic of Kazakhstan
1	<i>Achillea asiatica</i> Serg.		In meadows, forests and forest edges, coastal rocks, sand and gravel, on roads [8]	
2	<i>Achillea arabica</i> Kotschy.		On open clay rocks, sandy slopes, pebbles, sometimes next to roads, along the edges of fields	
3	<i>Achillea filipendulina</i> Lam.		On stones, forest belts, fallow lands, in thickets [8]	
4	<i>Achillea inundata</i> Kondr.		By hills, meadows, chestnut soil steppes	
5	<i>Achillea kamelinii</i> Kupr.		On the steppe slopes, forests	
6	<i>Achillea karatavica</i> Kamelin		On the steppe slopes in the river valleys. (South Kazakhstan region, Karatau Range) [8]	
7	<i>Achillea micrantha</i> Willd.		Occurs in fields, on mountain slopes, in forests and steppes, as well as in meadows [8]	















8	<p><i>Achillea millefolium</i> L.</p>		<p>Along roads, in settlements, sometimes in forests [8]</p>	
9	<p><i>Achillea nobilis</i> L.</p>		<p>On steep slopes, fallow lands, semi-deserts, along the road, in mineralized forest belts [8]</p>	
10	<p><i>Achillea schmakovii</i> Kupr.</p>		<p>In subalpine meadows</p>	
11	<p><i>Achillea sergievskiana</i> Shaulo & Shmakov</p>		<p>In mountain tundra and alpine meadows.</p>	
12	<p><i>Achillea setacea</i> Waldst. & Kit.</p>		<p>In the steppe, in dry meadows, in the floodplains of steppe rivers, sands [8]</p>	
13	<p><i>Achillea stepposa</i> Klokov & Krytzka</p>		<p>On the steppe slopes, in the forest, in places where chalk and limestone are deposited, sometimes near roads</p>	
14	<p><i>Achillea kasakhstanica</i> × Kupr. et Alibekov</p>		<p>In the steppe, in the meadows near steppe rivers, along the stony steppes</p>	

Table 2 - Ethnopharmaceutical use of various species of the yarrow genus

No.	Species	Country/Region	Ethnopharmaceutical Application	References
1	<i>A. ageratum</i> L.	Southwestern Morocco	For the treatment of gastrointestinal disorders. It has a cytostatic, anti-inflammatory, analgesic and antipyretic effect	[9]
2	<i>A. aleppica</i> DC. subsp. <i>aleppica</i>	Türkiye	Diuretic, for the treatment of hemorrhoids and as a medicinal plant with antimicrobial, anti-inflammatory (inflammation of the urinary tract) and antinociceptive properties	[10, 11]
3	<i>A. alpine</i> L.	China	Treatment of acute inflammation, has anti-inflammatory, antipyretic and sedative effects	[12]
4	<i>A. atrata</i> L.	Serbia	As a tonic in diseases of the bronchi and larynx, as well as for the treatment of pulmonary diseases	[13]
5	<i>A. Biebersteinii</i> Afan.	Türkiye	snake bite remedy; for healing wounds and treating abdominal pain	[14, 15]
6		Jordan	As a carminative treatment	[16]
7		Iran	Anthelmintic agent; for the treatment of fever, indigestion, deep wounds and burns, and for the treatment of heart disease	[17]
8	<i>A. clypeolata</i> Sm.	Serbia	To treat kidneys, increase appetite and soothe coughs (tea)	[18]
9	<i>A. collina</i> (Wirtg) Heimerl	Italy	For the treatment of the digestive system in the form of a tincture	[19]
10	<i>A. collina</i> Becker	Romania	Effective antispasmodic and bitter tonic with antihemorrhagic action	[20]
11	<i>A. erba rotta</i> All.	Italy	Inflorescences: As a compress on the eyes against conjunctivitis	[21]
12	<i>A. filipendulina</i> Lam.	Kazakhstan	Abortive remedy and for gastrointestinal diseases (as a decoction)	[22]
13	<i>A. fragrantissima</i> (Forssk.) Sch.	Palestine	Hypoglycemic agent for the preparation of antidiuretic drinks and for the treatment of stomach diseases	[23, 24]
14	Bip	Egypt and North Africa	Powerful anthelmintic, emmenagogical, antiseptic, antipyretic, antispasmodic plant; to reduce fever, headache and weakness (extract), which has a therapeutic value in anemia, various disorders of the central nervous system (CNS), both mental and motor, such as hysteria, mild convulsions, epilepsy, for the treatment of eyes, diseases (external application) and other CNS problems	[25, 26]
15	<i>A. ligustica</i> All.	Italy	As an antimicrobial and hemostatic agent for the treatment of stomach pains, infusions: To relieve gastralgia and neuralgia, as well as cataplasma against rheumatism and skin diseases; anthelmintic	[27, 28, 29]
16		Corsica	With cataplasms to relieve sprains and insect bites, to stop hemorrhages	[30]
17	<i>A. millefolium</i> Agg.	India	Used in medicine, veterinary medicine and cosmetics	[31]
18	<i>A. millefolium</i> L.	Europe	For making herbal filtered tea; antiviral, gastroprotective, anti-inflammatory, diuretic and analgesic medicinal herbs; treat bruises, pulmonary disorders, inflammation, respiratory diseases, urination and hepatobiliary system disorders, hyperactivity of the cardiovascular system, spasmodic gastrointestinal complaints, as an appetite enhancer, a drug with a pronounced wound healing effect and gastric antisecretory action	[32-36]
19		Türkiye	As a diuretic, carminative, antispasmodic, insecticidal agent; for the treatment of abdominal pain and stomach pain; shows symptomatic relief in colds, ulcers and diarrhea	[37]
20		Italy	for making relaxing tea (camomillün)	[38]
21		India	known as an astringent, stimulant, tonic, diaphoretic, antispasmodic, wound healing agent; for the treatment of rheumatism, epilepsy, flatulence, colds, colic, heartburn, hysteria; to suppress bleeding; in the treatment of skin, diseases, toothache and copious mucous secretions	[39, 40]
22		Northern Greece	Herb tea; as part of lotions and ointments for external use in pharmaceutical products	[41]
23		Iran	Expectorant, anti-infective, anticonvulsant, astringent, antidiabetic, antiallergic, antispasmodic, antidandruff, antipyretic, anti-inflammatory and tonic; carminative and effective wound healing agent; treatment of digestive problems, hay fever, hypertension, eczema and hemorrhoids; compression of blood vessels and anorexia; stomach tonic; disinfectants for the urinary tract; reduction of hypertension and asthma; It has antibacterial and antimicrobial, antiviral, anthelmintic, insecticidal, antipyretic, sedative properties; in the use of breastfeeding infants, the regulation of female menstruation and the prevention of epilepsy	[42, 43]
24		Palestine	Diaphoretic, stimulant, antipyretic, analgesic, anti-inflammatory, antispasmodic, carminative, anthelmintic, hepatoprotective, antispasmodic; treatment of various liver diseases	[44]
25		Brazil	An effective anti-inflammatory, analgesic, antispasmodic and antiseptic	[45]
26		Serbia	For women's diseases (problems related to menopause), colds, breathing problems and nausea (tea)	[46]
27		Georgia	antiseptic agent; for the treatment of gastrointestinal diseases with anemia	[47]

28	<i>A. moschata</i> Wulfen	Italy	Healing, analgesic, digestive and hemostatic	[48]
29	<i>A. nigrescens</i> (E. Mey.) Rydb	Türkiye	Diuretic and anti-hemorrhoid	[49]
30	<i>A. nobilis</i> (A. Kern.) Formanek	Iran	Animal antiparasitic, healing and anti-infective agent	[50]
31	<i>A. santolina</i> L.	Jordan, Irak	Depurative, antihelminthic, with promising carminative properties from intestinal colic, insect repellent, as well as abdominal pain, dysentery and inflammation	[51-54]
32		North Africa	To treat toothache	[55]
33		Iran	For the treatment of diseases of the chest; also as a tonic and carminative	[56]
34	<i>A. santolinoi</i> des subsp. <i>Wilhelmsii</i> (K.Koch) Greuter.	Palestine	For indigestion, diabetes, obesity and diarrhea	[57]
35	<i>A. schischkinii</i> Sosn.	Türkiye	Antimicrobial, anti-inflammatory and antinociceptive agent	[58]
36	<i>A. talagonica</i> Boiss.	Iran	Immunosuppressive, anti-inflammatory and analgesic effects	[59]
37	<i>A. toentosa</i> L.	Jordan	For pain in the stomach	[60]
38	<i>A. vermicularis</i> Trin.	Türkiye	For the treatment of colds, flu and abdominal pain	[61]
39	<i>A. wilhelmsii</i> Koch.	Iran	Antihypertensive and antihyperlipidemic activity in vivo	[62]
40		Italy	For the treatment of gastrointestinal disorders	[63]
41		Türkiye	For the treatment of hemorrhoids	[64]
42		Palestine	Therapeutic effects in stomach pain, diabetes, gastric and obesity (both decoction and infusion)	[65]
43	<i>A. wilsoniana</i> Heimerl ex Hand.-Mazz	China	For detoxification, hemostasis and aceodin	[66]

proliferative, antinociceptive, analgesic, antiplatelet, anxiolytic action [9-66].

It is noted that only three Kazakh species of yarrow are known to be used in folk medicine: *A. filipendulina*, *A. millefolium*, *A. nobilis*. At the same time, only *A. filipendulina* has found application in local folk practice as a remedy for gastrointestinal diseases and abortive agent [22]. According to this observation, it was accepted that the species *A. filipendulina* is of significant scientific and practical interest as an object of research.

Achillea filipendulina L. and its phytochemical composition
Achillea filipendulina L. is a perennial plant growing in the Caucasus and Central Asia (Fig. 1) [2-3].

A. filipendulina is a hemicryptophyte, xeromesophyte, belongs to the desert geographical type and the Turanian class. Perennial plant up to 120 cm tall. Inflorescences of *Achillea filipendulina* Lam., complex corymbose and flat outlines (diameter 10-12 cm), consisting of baskets 4-6 mm in diameter. Baskets are formed by marginal flowers on the outside and tubular in the middle. The leaves



Figure 1 – *Achillea filipendulina* Lam.

are grayish-green, openwork, pinnatipartite, light green. Flower baskets up to 0.5 cm in diameter, collected in flat, dense corymbs up to 13 cm in diameter. Marginal flowers are single-row, golden yellow, tubular -yellow. Blooms from July 30-35 days. Fruits in September [3].

Yarrow contains a number of biologically active compounds such as flavonoids, acids, carotenoids, tannins, coumarins and alkaloids. These compounds are responsible for a number of pharmacological properties, such as anti-inflammatory, antibacterial, antiallergic, antiseptic and antitoxic effects.

According to the analysis of literary sources, it was found that the following compounds were identified in the composition of *A. filipendulina*: tricyclene, pinene, camphene, sabinene, pinene, myrcene, n-cymene, limonene, 1,8-cineol, santolin alcohol, γ -terpinene, hotrienol, cis-sabinene hydrate, cyclocitral, pinene oxide, terpinolene, trans-sabinene hydrate, campholenal, terpineol, camphor, pinocarvone, cis-verbenol, borneol, 4-terpineol, myrtenal, myrtenol, trans-carvel, nerol, bornyl format, ascaridiol, cavicol,



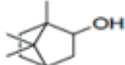
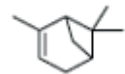
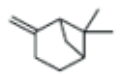
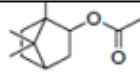
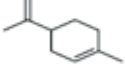
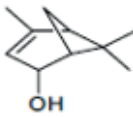
chrysanthey acetate, bornyl acetate, verbenone, neryl acetate, elemen, germakren D, γ -elemen, spatulenol, caryophyllene oxide, torreiol, eudesmol, alloaromadendren oxide, n-kimen, pinocamphone [67- 68].

The predominant components of the essential oil of *A. filipendulina* flowers and leaves are oxygenated monoterpene. Essential oil from *A. filipendulina* is mainly composed of chrysantheylacetate (19.11%), 1,8-cineol (17.18%), santolinic alcohol (29.1%), borneol (7.66%), alpha-pinene (8.77%), beta-pinene (5.73%), limonene (3.10%), bornioacetate (7.16%), cis-verbenol (5.65%), which are presented in Table 3 [67- 68].

Achillea filipendulina is a valuable plant that is widely used in folk medicine. However, further research is needed to fully understand the mechanisms of action and clinical efficacy of this yarrow species.

Conclusion. Plants of the genus *Achillea* have been widely used in modern and folk medicine since ancient times, and are also significant as a valuable source of biologically active substances. Among the 14 Kazakh species

Table 3 - The main components of the essential oil of *Achillea filipendulina*

No.	Name	Structure
1	Chrysantheylacetate	
2	1,8-cineol	
3	Santolin alcohol	
4	Borneol	
5	Alpha pinene	
6	Beta pinene	
7	Bornylacetate	
8	Limonene	
9	Verbenol	

of yarrow, *Achillea filipendulina*, which has found application in local folk medicine, is of the greatest scientific interest. Its medicinal properties require more in-depth research and confirmation of efficacy and safety by scientific

research. Further clinical and preclinical studies may help to more fully uncover the potential of the species in the treatment of specific diseases and determine the optimal dosages and regimens of application.

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