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Research Article

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Search for promising medicinal plants of the *Rosaceae* family in the flora of the Mangistau Region

The study of medicinal plants in the regions of Kazakhstan is of great importance for identifying new sources of medicinal raw materials. The Mangistau Region is one of the least studied areas in Kazakhstan in terms of the potential and raw material resources of medicinal plants. This study assessed the potential medicinal use of members of the Rosaceae family. Twelve species belonging to eight genera of the Rosaceae family were recorded in the Mangistau Region. Among life forms, trees (4), shrubs (6), annual (1), and perennial (1) herbs were identified. In terms of ecology, the species were classified as mesophytes (7), xeromesophytes (4), and xerophytes (1); in terms of substrate type, they were classified as psammophytes (1), petrophytes (3), lithophytes (4), and glycophytes (4). The distribution of representatives of this family is ranked as follows: common — 2 taxa, rare — 1, very rare — 6. This situation can be explained by historical reasons and the climatic characteristics of the region. The potential for the medical use of all 12 taxa in the prevention and treatment of various groups of diseases has been established. The introduction of all identified species of this family is recommended, as there are no natural reserves for harvesting raw materials. The data obtained allow for planning further research on their introduction and practical application in medicine and for the production of para-pharmaceutical products.

Keywords: Rosaceae family, medicinal plants, summary, life forms, ecological groups, distribution, potential for medical use.

Introduction

Medicinal plants are of great importance worldwide as a source of new drugs, cosmetic preparations, and raw materials for the food industry [1]. For example, in Europe, more than 1,300 medicinal plants are used, of which up to 90 % are considered non-traditional, including wild resources. In the U.S., up to 85 % of prescriptions are based on natural ingredients. When analyzing the situation in developing countries in South America, Africa, and Southeast Asia, more than 80 % of the population uses exclusively traditional medicine, that is, remedies derived from plant and animal sources [2]. In the healthcare systems of developed countries, up to 25 % of prescriptions are for plant-based remedies.

The use of medicinal raw materials varies by country. Traditional Chinese and Indian medicine utilize up to 11,000 plant species, whereas European countries use approximately 300 species (Fig. 1).

Herbal medicines have an advantage over synthetic ones, which lies in their low toxicity, generally mild action, rare induction of allergic reactions, and the possibility of repeated and long-term courses of treatment and prevention. Therefore, the study of plants and the development of highly effective medicines based on them is one of the pressing tasks of medical and pharmaceutical science.

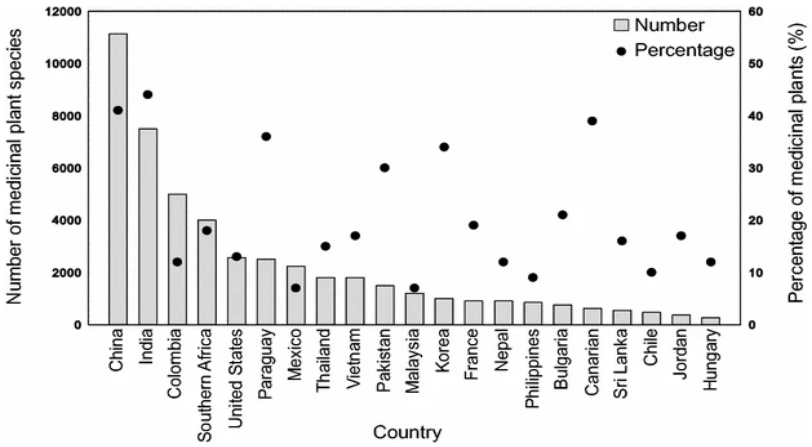

Figure 1. Number and percentage of medicinal plant use in different countries.
The bars in the histogram show the number of species, the dots show the percentage (according to Chen et al., 2016)

In recent decades, there has been a sharp increase in demand for herbal medicines, natural health products, and over-the-counter medications, leading to a rise in their use [3]. According to the IUCN, between 50,000 and 80,000 flowering plant species worldwide are used by people for medicinal purposes [4]. This raises the issue of preserving medicinal resources, as some authors estimate [5] that one medicinal species disappears every two years. Approximately 15,000 species are threatened with extinction, and 20 % of natural resources have been virtually depleted as a source of raw materials [6]. This problem is particularly acute in Africa, India, and China. The risk of extinction is linked to habitat destruction and intensive harvesting, which prevents plants from regenerating their populations.

Therefore, many countries around the world are developing regional programs to assess the status of natural resources, monitor their condition, evaluate genetic diversity, and implement in situ and ex situ conservation programs [6–8]. The most common measures include: conservation in natural habitats, shifting industrial production to cultivation, and conservation in the form of living collections at botanical institutions and seed banks (Fig. 2).

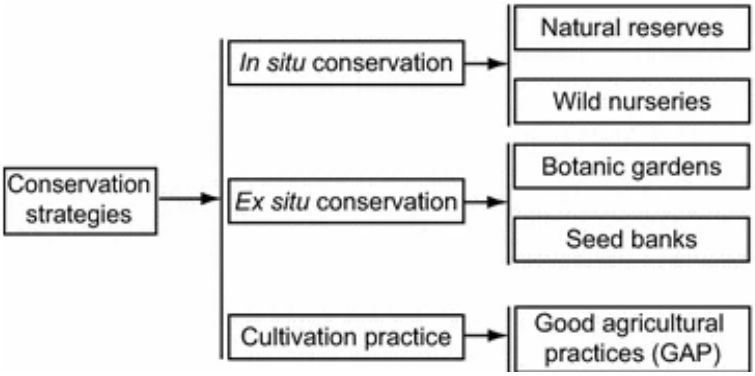

Figure 2. Schemes of methodological systems for the conservation of medicinal plants in global practice

Thus, an analysis of the global situation regarding medicinal plants reveals prospects for their comprehensive study, both in the wild and in cultivation, as well as the expansion of their practical applications. Among taxonomic groups, the Rosaceae family is of particular interest, as its species possess many useful properties: edible, ornamental, honey-producing, forage, medicinal, and decorative, among others.

The aim of this study is to assess the potential of medicinal plants of the Rosaceae family in the flora of the Mangistau Region for use in the treatment and prevention of various diseases.

Experimental

The subject of the study was species of the Rosaceae family in the flora of the Mangistau Region. Data analysis was conducted in 2025–2026. A summary of the species of this family was compiled based on an

analysis of field journals, MANG herbarium materials, data from the iNaturlist platform, and a summary of the region's flora [9].

The names of the accepted plant taxa are given according to data from the Plants of the World Online (POWO) platform [10].

To assess the potential for utilizing raw materials from natural habitats, the occurrence of this family's representatives in the wild was evaluated using the following categories: common, occasional, rare, and very rare [11].

Plants were ranked according to their medicinal properties based on literature data [12–18].

Results and Discussion

The territory of the Mangistau Region (Western Kazakhstan) is characterized by extremely arid conditions [19], which creates difficulties for the growth of many plant groups; however, the climatic conditions (moisture deficit and high solar insolation) are favorable for the accumulation of many groups of biologically active substances [20, 21].

An analysis of data on the region's flora showed that 770 species of vascular and higher spore-bearing plants, belonging to 333 genera and 73 families, grow in the region [9]. The largest families are Asteraceae, Boraginaceae, Brassicaceae, Caryophyllaceae, Chenopodiaceae, Fabaceae, Poaceae, and Polygonaceae, which account for up to 65 % of the total number of species.

The Rosaceae family in the flora of the Mangistau Region is not large in terms of species composition, comprising 12 species from 8 genera (Tab. 1).

Table 1

List of species of the Rosaceae family in the flora of the Mangistau Region, with brief descriptions

No.	Species	Life form	Ecological group	Economic importance	Distribution
1	*Armeniaca vulgaris* Lam.	Tree	Xeromesophyte, glycophyte	Medicinal, edible, ornamental, honey plant	Very rare
2	*Crataegus altaica* Lge.	Tree	Xeromesophyte, petrophyte	Ornamental, honey plant, medicinal, edible	Very rare
3	*Crataegus ambigua* C.A. Mey	Tree, shrub	Xeromesophyte, lithophyte	Ornamental, honey plant, medicinal, edible	Occasional
4	*Malus sieversii* (Ledeb.) M. Roem.	Tree	Mesophyte, lithophyte	Medicinal, edible, fodder, ornamental, honey plant	Very rare
5	*Potentilla pedata* Willd. ex Hornem.	Perennial	Xerophyte, psammophyte	Ornamental, medicinal	Common
6	*Potentilla supina* L.	Annual, biennial	Mesophyte, petrophyte	Medicinal, forage, ornamental, honey plant	Occasional
7	*Prunus spinosa* L.	Shrub	Mesophyte, glycophyte	Medicinal, edible, forage, ornamental, honey plant	Very rare
8	*Rosa canina* L.	Shrub	Mesophyte, glycophyte	Medicinal, edible, ornamental, honey plant	Very rare
9	*Rosa iliensis* Chrshan.	Shrub	Mesophyte, lithophyte	Medicinal, ornamental	Very rare
10	*Rosa laxa* Retz.	Shrub	Mesophyte, glycophyte	Medicinal, edible, ornamental	Occasional
11	*Rubus caesius* L.	Shrub	Mesophyte, lithophyte	Medicinal, edible, forage, ornamental, honey plant	Common
12	*Spiraea hypericifolia* L.	Shrub	Xeromesophyte, petrophyte	Medicinal, forage, ornamental, honey plant	Rare

Despite the extremely arid conditions of the Mangistau Region, most of the identified species are mesophytes in terms of moisture requirements — 7 taxa, or 58.3 % — while 4 species are classified as xeromesophytes, accounting for 33.3 %. Only one species is classified as xerophytes — 8.2 %. This is due to the fact that members of this family primarily grow in gorges, along streams, springs, and seasonal watercourses — that is, in relatively more humid areas. The only xerophyte (*Potentilla pedata*) grows on mountain slopes, in desert zones, and on sandy soils.

In terms of life forms, 4 taxa (33.3 %) are trees, 6 species (50.0 %) are shrubs, and 1 species each (8.2 %) are classified as perennials and herbaceous perennials.

A pronounced ecological differentiation is also observed in relation to the substrate. Thus, the psammophyte (1 taxon — *Potentilla pedata*) grows on sandy soils and helps stabilize the sand. Petroophytes comprise 3 species: *Spiraea hypericifolia, Crataegus altaica*, and *Potentilla supina*, which are restricted to rocky slopes and plains, as well as gravelly scree. Lithophytes (4 species: *Rubus caesius*, *Crataegus ambigua, Rosa iliensis, Malus sieversii*) grow primarily in the cracks of rocky outcrops, especially along springs and streams, and are thus adapted to extreme arid conditions and a limited soil layer. Glycophytes are represented by 4 species (*Armeniaca vulgaris, Prunus spinosa, Rosa canina, Rosa laxa*) and prefer slightly saline soils.

This ratio of ecological groups indicates that the flora of this family formed at the junction of typically steppe, boreal, and desert elements. It is likely that in earlier periods, members of the Rosaceae family were more widely distributed; however, due to subsequent aridification of the climate, their range narrowed to limited mountainous areas where fresh water sources are present.

In terms of distribution within the study area, the species were distributed as follows: common — 2 taxa (16.5 %), including *Rubus caesius* and *Potentilla pedata*. Three taxa (25 %) are occasionally found, including *Rosa laxa, Potentilla supina,* and *Crataegus ambigua*. Only one taxon (8.2 %) falls into the "rare" category -*Spiraea hypericifolia*. The remaining 6 species (50.5 %) fall into the "very rare" category. This situation is linked to the region's climatic conditions, where Rosaceae species grow in more humid areas associated with oases and mountainous regions with springs. This results in a limited number of suitable habitats. This situation indicates the limited availability of raw materials in natural conditions, meaning there is a need to introduce and subsequently cultivate species of the Rosaceae family for their practical use.

When considering their beneficial properties, it was noted that all members of this group possess medicinal, edible, honey-producing, and ornamental properties.

A separate analysis was conducted on the potential medicinal properties of species in the Rosaceae family. For example, **Armeniaca vulgaris** is a valuable source of minerals, pectin, free sugars, pigments, and flavonoids. In folk medicine, it is used for cardiovascular diseases, to boost immunity (Table 2), as a vitamin supplement, for diabetes prevention, and to improve digestion and vision [14].

Table 2

Medicinal properties of medicinal plants of the Rosaceae family growing in the Mangistau Region

No.	Species	Medicinal properties						
		For the treatment of the cardiovascular and nervous systems	For the treatment and prevention of gastrointestinal diseases	For allergies and as an antitoxic	As a vitamin supplement	To boost immunity	For the treatment and prevention of kidney diseases	Other
1	*Armeniaca vulgaris* Lam.	+	+		+	+		+
2	*Crataegus altaica* Lge.	+	+	+	+			+
3	*Crataegus ambigua* C.A. Mey	+	+	+	+			+
4	*Malus sieversii* (Ledeb.) M. Roem.		+	+	+	+	+	+
5	*Potentilla pedata* Willd. ex Hornem.	+				+		+
6	*Potentilla supina* L.	+				+		+
7	*Prunus spinosa* L.	+	+		+			+
8	*Rosa canina* L.	+	+		+	+		+
9	*Rosa iliensis* Chrshan.	+	+		+	+		+
10	*Rosa laxa* Retz.	+	+		+	+		+
11	*Rubus caesius* L.	+	+	+	+		+	+
12	*Spiraea hypericifolia* L.			+				+

The flowers and fruits of *Crataegus altaica* and *Crataegus ambigua* are also a source of vitamins, carotenoids, sugars, and phenolic compounds. They are used in conventional and traditional medicine to treat cardiovascular diseases, as a sedative for the nervous system, as a vitamin supplement, to improve brain function, for hypertension, to improve gastrointestinal function, and as an anti-allergic and antioxidant agent [15].

Malus sieversii is a source of minerals, vitamins, pectins, sugars, and organic acids. The fruits have a beneficial effect on gastrointestinal function, possess mild diuretic and cholagogue properties, promote the elimination of heavy metal salts from the body, and have a general tonic effect [16].

The herbs *Potentilla pedata* and *Potentilla supina* have anti-inflammatory, general tonic, anti-burn, and antimicrobial effects and positively influence the functioning of the cardiovascular system [17].

The fruits *of Prunus spinosa* contain sugars, vitamins, pectins, flavonoids, and organic acids. They are used fresh or dried for constipation, as a carminative and vitamin supplement; they strengthen blood vessel walls, normalize blood pressure, and lower blood cholesterol levels [12, 13].

The fruits of *Rosa canina*, *Rosa iliensis*, and *Rosa laxa* are used as a vitamin supplement; they possess anti-inflammatory, antimicrobial, and cholagogue properties. A decoction is used for hypertension, to strengthen blood vessel walls, and as a sedative [12].

The fruits and leaves *of Rubus caesius* contain minerals, pectins, vitamins, coumarins, fatty oil, and essential oil. The plant is included in vitamin, cholagogue, and stomachic preparations. The roots possess hemostatic properties. In folk medicine, the leaves are used to normalize intestinal peristalsis and externally to wash wounds; decoctions and juice serve as sedatives and antipyretics [12, 13].

The shoots and flowers of *Spiraea hypericifolia* possess antioxidant and antiviral activity, and extracts exhibit antimicrobial and anti-inflammatory effects [18].

Thus, it has been established that all species of the Rosaceae family have potential for medical use in the prevention and treatment of diseases of various etiologies. 10 species are used to treat cardiovascular diseases, 9 taxa are used to treat the gastrointestinal tract, 5 taxa are used as antiallergic and antitoxic agents, 9 species are used as vitamin supplements, 7 species are used to boost immunity, 2 species for the prevention and treatment of urinary tract diseases, and 12 species possess other pharmacotherapeutic properties.

Conclusion

Thus, 12 species of the Rosaceae family have been identified growing in the Mangistau Region. Among the life forms, trees, shrubs, and annual and perennial herbs were identified. In terms of ecology, the species were classified as mesophytes, xeromesophytes, and xerophytes; in terms of substrate type, they were classified as psammophytes, petrophytes, lithophytes, and glycophytes. The distribution of representatives of this family ranges from common to very rare; most of the identified species occur only in limited areas within the region, which is due to the region's climatic characteristics. The potential for the medical use of all 12 taxa in the prevention and treatment of various groups of diseases has been established.

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Author Contributions

The manuscript was written with contributions from all authors. All authors have approved the final version of the manuscript. CRediT: **Gassanova G.G.** — conceptualization, draft writing, data analysis; **Tolep N.A.** — data collection, medicinal plant ranking; **Lukmanov A.B**. — herbarium analysis.

Conflict of Interest

The authors declare no conflict of interest.

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Маңғыстау облысының флорасындағы *Rosaceae* тұқымдасының перспективалы дәрілік өсімдіктерін іздеу

Қазақстанның өңірлеріндегі дәрілік өсімдіктерді зерттеу дәрілік шикізаттың жаңа көздерін іздеу үшін аса маңызды. Маңғыстау облысы дәрілік өсімдіктердің әлеуеті мен шикізат ресурстары тұрғысынан Қазақстанда ең аз зерттелген аймақ. Осы зерттеу аясында *Rosaceae* тұқымдасының өкілдерін дәрілік мақсатта қолдану әлеуетін бағалау бойынша зерттеу жүргізілді. Маңғыстау облысының аумағында

сегіз тұқымдасқа жататын *Rosaceae* тұқымдасының он екі түрі анықталды. Анықталған өмір сүру формаларына ағаштар (4), бұталар (6), біржылдықтар (1) және көпжылдықтар (1) жатады. Экологиялық тұрғыдан түрлер мезофиттерге (7), ксеромезофиттерге (4) және ксерофиттерге (1); субстрат түрі бойынша олар псаммофиттерге (1), петрофиттерге (3), литофиттерге (4) және гликофиттерге (4) жатқызылды. Осы тұқымдас өкілдерінің таралуы мынадай түрде жіктеледі: кең таралған — 2, сирек кездесетін — 1, өте сирек кездесетін — 6 таксон. Бұл жағдайды тарихи себептер мен өңірдің климаттық ерекшеліктерімен түсіндіруге болады. Барлық 12 таксонды әртүрлі ауру топтарын алдын алу және емдеу мақсатында медицинада қолдану әлеуеті анықталды. Осы тұқымдастың барлық анықталған түрлерін енгізу ұсынылған, себебі шикізат жинауға арналған табиғи қорықтар жоқ. Алынған мәліметтер оларды медицинада енгізу мен практикалық қолдану және парафармацевтикалық өнімдер өндіру бойынша әрі қарай зерттеулерді жоспарлауға мүмкіндік береді.

Кілт сөздер: *Rosaceae* тұқымдасы, дәрілік өсімдіктер, шолу, өмірлік формалар, экологиялық топтар, таралуы, медициналық қолдану әлеуеті.

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Поиск перспективных лекарственных растений семейства *Rosaceae* во флоре Мангистауской области

Изучение лекарственных растений в регионах Казахстана имеет важное значение для поиска новых источников лекарственного сырья. Мангистауская область является наименее изученной территорией в Казахстане в отношении потенциала и сырьевых ресурсов лекарственных растений. В рамках данной работы выполнены исследования по оценке потенциала применения представителей семейства Rosaceae в медицинских целях. На территории Мангистауской области выявлено произрастание 12 видов семейства Rosaceae из 8 родов. Среди жизненных форм выявлены деревья (4), кустарники (6), мало- (1) и многолетние (1) травы. По экологии виды были ранжированы на мезофиты (7), ксеромезофиты (4) и ксерофиты (1), по отношению к типу субстрата — на псаммофиты (1), петрофиты (3), литофиты (4) и гликофиты (4). Распространение представителей данного семейства ранжировано следующим образом: обычно — 2 таксона, редко — 1, очень редко — 6. Данная ситуация объясняется историческими причинами и климатическими особенностями региона. Установлен потенциал применения всех 12 таксонов в медицинских целях для профилактики и лечения различных групп заболеваний. Рекомендуется интродукция всех выявленных видов данного семейства, так как в природных условиях отсутствуют запасы для сбора сырья. Полученные данные позволяют планировать дальнейшие исследования по введению в интродукцию и практическому применению в медицине и для получения парафармацевтических средств.

Ключевые слова: семейство *Rosaceae*, лекарственные растения, конспект, жизненные формы, экологические группы, степень распространенности, потенциал применения в медицине.

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