DOI 10.31489/2020BMG3/43-53

UDC 58.002:712 (574.1)

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Results of study of wild medicinal plants of Mangystau region

The study of medicinal plants in the flora of the Mangystau region was the practical interest in assessing the full species composition and prospects for the use of raw materials for the medical and pharmaceutical industries. During 2013–2020, field surveys were carried out to identify the species composition of medicinal plants, their ranking, raw materials and the characteristics of the passage of the main phases of vegetation. The article presents the results of the analysis of the species composition of wild medicinal plants in the natural conditions of Mangystau and their ranking. As a result, the list of medicinal plants amounted to 166 species from 112 genera and 43 families. The predominant number of species is assigned to the families *Asteraceae, Chenopodiaceae, Fabaceae, Brassicaceae, Lamiaceae, Apiaceae, Scrophulariaceae, Boraginaceae, Euphorbiaceae* and *Ranunculaceae*. The largest part of medicinal plants is assigned to species used in folk medicine — 144 species; pharmacological properties were found for 50 species; 36 species are included in the Pharmacopoeia of the Republic of Kazakhstan. All plants species were ranked into 10 groups of pharmaceutical-therapeutic activity against different diseases: gastrointestinal tract, oral cavity, kidneys and urinary tract, respiratory tract, antipyretic and anti-inflammatory, cardiovascular system, diabetes mellitus, analgesic and wound healing, skin organs, other diseases. There was performed ranking of medicinal plant species into 4 groups by degree of distribution, area of thickets and possibility of stock collection of vegetal raw materials. A collection calendar has been compiled for 166 species of medicinal plants in the flora of the Mangystau region. The obtained data can be used for organization of systematic harvesting of vegetal raw materials and development of environmental measures.

Keywords: medicinal plants, Mangystau, prospect, calendar of gathering, raw materials, pharmacological activity, use in official and folk medicine.

Introduction

Biodiversity conservation is an important component of bio preservation. In addition to the Convention on Biodiversity (1992), which focuses on the conservation, study and protection of biological diversity as a guarantor of ecosystem sustainability, the Global Plant Conservation Strategy (2002) was adopted at the 6th Conference of the Parties to the Convention [1]. At the same time, it is recommended to develop regional and national plant conservation strategies that take into account the specificities of the regions. Therefore, the current task of botany is a comprehensive study of individual groups and species of useful plants for their economic use. Studying and obtaining a complete botanical resource characteristic for each raw material plant is the basis for the development of a scientifically based regime for the use of economically valuable plants that exclude the degradation of their populations or the destruction of species. The whole complex of research is most concerned with wild beneficial plants, widely used in the national economy and medicine [2].

In the Mangystau region, species of economically valuable plants are very poorly studied and therefore this issue is very relevant for the region. Previously conducted botanical research (T.F. Yakubov, 1955; N.U. Kisykov, 1955; S.M. Ageeva, 1955, 1974; N.I. Safronova, 1996; N.K. Aralbay, G.M. Kudabaeva, A.A. Imanbayeva et al., 2010; A.A. Imanbayev et al., 2010) made it possible to determine the species composition of vascular plant flora [3–9], to identify rare and endangered species [8], to determine the composition of wild relatives of cultivated plants [10, 11], to investigate the resources of some medicinal plants [12–15].

Despite significant advances in medicine in recent decades, according to WHO; approximately 80 % of the world's population, about 4 billion people, use medicinal plants to treat various diseases [16–19]. Medicinal raw materials attract people with their complex action, low cost, lack of side effects and low cost. Therefore, the introduction of local flora into the practical use of medicinal plants is an urgent task in the Republic of Kazakhstan.

The purpose of the present study is to summarize the results of the study of medicinal plants in the natural flora in the Mangystau region.

Methodology

The objects of the study were wild medicinal plants of the Mangystau region (the Western Kazakhstan). Detection of medicinal species is performed on the basis of literature data [16–18, 20–23]. The search for medicinal plants was carried out by route reconnaissance and semi-stationary methods (2013–2020). The collection of herbarium and reproductive material of medicinal plants was carried out during expeditionary trips to Mangystau. The definition of species is made according to the generally accepted determinants [24, 25], the clarification of Latin names — according to S.K. Czerepanov [26]. The identified medicinal plants are ranked in 4 categories by the degree of prevalence, area of thickets and possible reserves of plant raw materials: 1) with a wide habitat, forming significant natural thickets and suitable for industrial harvesting of raw materials; 2) with a wide habitat, forming small natural thickets and suitable for the preparation of raw materials for the needs of the local pharmacy chain; 3) species having a wide habitat, however, growing sporadically and not forming natural thickets suitable for collecting raw materials; and 4) species with conservation status, that is, rare, endangered and endemic.

Species were ranked by use in scientific, official and folk medicine, as well as by manifested pharmacological properties based on literary data [16–23].

The determination of resources in communities was carried out by the method of accounting sites. The size of the accounting site was 1 m2, the number of them was laid from 30 to 50 [27]. The territory of the thickets was reduced to any geometric figure, its sides were measured, and the area was calculated. The production reserve of raw materials of above-ground mass was calculated by multiplying the yield of raw materials by the area of thicket. The volume of possible harvests was calculated in the amount of 30–50 % of the exploitation stock, based on the biological characteristics of species and the state of populations; underground organs — in the amount of 10–20 % of the exploitation reserve.

Compilation of collection calendar was carried out on the basis of analysis of vegetation phases and recommendations on gathering of raw materials of medicinal plants [28].

Results and discussion

Mangystau region is located in the west of the Republic of Kazakhstan, in the desert zone. The territory includes the Mangyshlak Peninsula, the Ustyurt Plateau, the Buzachi and Tub-Karagan Peninsula, the Dead Kultuk and Kaidak sors. From the west, northwest and southwest it is washed by the waters of the Caspian Sea and is located between N 45 and 42°. In the north and northeast it borders with the Atyrau and Aktobe regions, in the east with Uzbekistan, and in the south with Turkmenistan (Kara-Bugaz-Gol Bay). The territory of the region has an area of 165.6 thousand square meters (16 million ha) and belongs to the desert zone [29, 30].

Most of the region's territory is occupied by wormwood-salt-marsh desert with areas of shrub vegetation on brown soils: the surface is partially covered with salt marshes, takyr salty soils and sands with extremely rare vegetation. The climate is sharply-continental, extremely arid. The average January temperature is –7 ºC, July +27 ºC (on some days the maximum temperature exceeds +40 ºC). The annual rainfall is about 100–150 mm.

Based on the analysis of literary sources and the results of own field studies, the most complete list of medicinal plants of the Mangystau region was compiled. Based on the taxonomic analysis of the above list, it was revealed that 166 species from 112 genera and 43 families grow on the territory of Mangystau (Table 1).

Table 1

Taxonomic composition of medicinal plants of vascular plants of Mangystau region

Family	Amount of genera, piece	Amount of species, piece	Amount of species, used in officinal medicine, piece	Amount of species, used in folk medicine, piece	Amount of species for which pharmacological activity is reported, piece
1	2	3	4	5	6
Amaranthaceae	1	3	-	2	2
Asparagaceae	1	1	-	1	
Apiaceae	6	8	1	6	3
Asteraceae	14	20	2	18	3
Boraginaceae	6	6	1	5	3

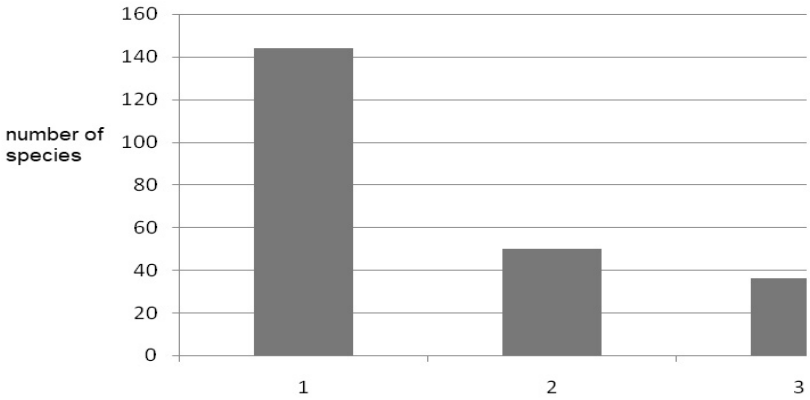
Continuation of Table 1

1	2	3	4	5	6
Brassicaceae	6	9	2	8	-
Capparaceae	1	1	-	1	-
Caprifoliaceae	1	1	-	-	1
Caryophyllaceae	3	5	-	5	1
Chenopodiaceae	12	16	4	14	5
Cuscutaceae	1	1	-	1	1
Dryopteridaceae	1	1	1	1	-
Elaeagnaceae	1	1	-	1	-
Ephedraceae	1	4	-	2	3
Equisetaceae	1	1	-	1	-
Euphorbiaceae	3	6	-	6	1
Fabaceae	8	14	5	10	9
Frankeniaceae	1	2	-	2	-
Fumariaceae	1	2	1	2	-
Gentianaceae	1	1	1	1	-
Iridaceae	1	1	-	1	1
Lamiaceae	8	8	5	8	-
Limoniaceae	1	2	-	1	2
Malvaceae	1	2	1	2	-
Moraceae	1	2	1	2	-
Nitrariaceae	1	2	-	2	2
Onagraceae	1	1	-	1	-
Orobanchaceae	1	2	-	2	2
Papaveraceae	2	3	-	3	2
Peganaceae	1	1	1	1	1
Plantaginaceae	1	2	2	1	-
Polygonaceae	3	3	-	3	-
Ranunculaceae	3	5	1	4	2
Rhamnaceae	1	1	-	1	-
Rosaceae	5	5	3	5	1
Rubiaceae	1	5	-	5	-
Rutaceae	1	1	-	-	1
Salicaceae	1	1	-	1	1
Scrophulariacaea	3	8	2	7	-
Solanaceae	2	2	1	2	1
Tamaricaceae	1	4	-	3	1
Thymeleaeceae	1	1	-	1	-
Urticaceae	1	1	1	1	1
Total: 43	112	166	36	144	50

The predominant number of species is assigned to the families *Asteraceae, Chenopodiaceae, Fabaceae, Brassicaceae, Lamiaceae, Apiaceae, Scrophulariaceae, Boraginaceae, Euphorbiaceae* and *Ranunculaceae*. Species from these 10 leading families make up 62.0 % of the total number of species of medicinal plants and 62.6 % of the total number of genera. The largest number of species and genera are marked by family *Asteraceae* — 22 species and 14 genera. The second place is taken by family *Chenopodiaceae* — 15 species from 12 genera. In the third position is family *Fabaceae* — 14 species from 8 genera. In fourth place is family *Brassicaceae* — 9 species from 6 genera. In families *Lamiaceae, Apiaceae* and Scrophulariaceae, 8 species from 8, 6 and 3 genera were found, respectively. Sixth place is taken by family *Euphorbiaceae* with 6 species from 3 genera, the seventh position is family *Ranunculaceae* with 5 species from 4 genera.

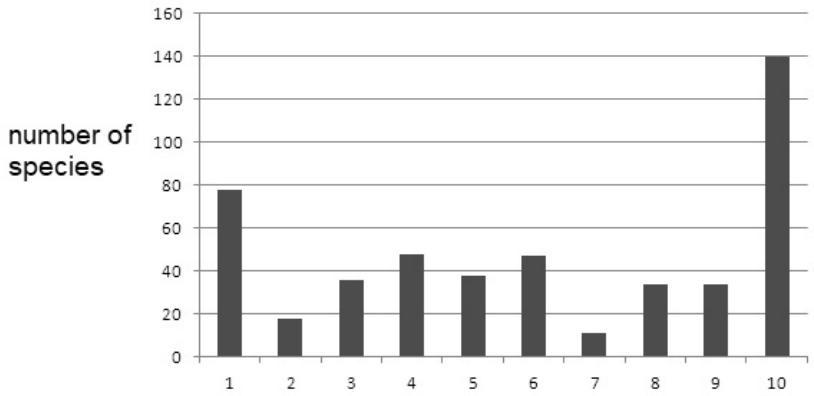
From 166 identified species of medicinal plants, the largest part belongs to species used in folk medicine (Fig. 1) — 144 taxa. For 50 species are determined some pharmacological properties. A small number of species (36 taxa) are used in official medicine.

Medicinal plants have a wide range of pharmacological activity. However, different properties are inherent in a different number of species. We have analyzed the possibility of using Mangystau medicinal plants to treat various diseases (Fig. 2).



1 — species, used in folk medicine; *2* — species with scientifically proven therapeutic properties; *3* — species included in the Pharmacopoeia of Kazakhstan

Figure 1. Ranking the medicinal species of the Mangystau region, by using in officinal and folk medicine



Use of medicinal plants in the treatment of diseases: *1* — gastrointestinal tract; *2* — pubic cavity; *3* — kidneys and urinary tract; *4* — respiratory tract; *5* — antipyretic and anti-inflammatory; *6* — cardiovascular system; *7* — diabetes mellitus; *8* — analgesic and wound healing; *9* — skin organs; *10* — other diseases

Figure 2. Ranking the medicinal plants of Mangystau region by pharmacological and therapeutic action

So, for the treatment of diseases of the gastrointestinal tract, 78 species of medicinal plants can be used, such as *Falcaria vulgaris, Ferula foetida, Inula britanica, Koelpinia*, and etc. For the treatment of diseases of the oral cavity, 18 species can be used: *Ferula karelinii, Cichorium intybus, Chenopodium alba, Limonium gmelinii, Capparis spinosa*, and etc. Against diseases of the kidneys and urinary tract, the use of 36 species is recommended: *Amaranthus retroflexus, Eryngium planum, Cardaria draba, Echinops ritro* and others.

For the treatment of diseases of the respiratory tract, 48 species of plants are used, for example, Urtica dioica, Teucrium polium, Chenopodium botrys, etc. 38 species are used as plants exhibiting anti—inflammatory and antipyretic effects: Artemisia santolinifolia, Artemisia scoparia, Cynoglossum officinale and others. For the treatment of the cardiovascular system, it is recommended to use 47 species: Ziziphora tenuior, Euphorbia falcate, Iris tenuifolia, Lycopus europaeus, etc. 11 species have a clay property: Ferula caspica, Artemisia lercheana, Artemisia sublessingiana, etc. For the treatment of gynecological diseases, 19 species are recommended: Amaranthus retroflexus, Artemisia austriaca, Sisymbrium loeselii, etc. As anti-diabetic additives, 11 species can be used: Cichorium intybus, Glycyrrhiza aspera, Glycyrrhiza glabra, Glycyrrhiza korshinskyi and others.

34 species have wound healing and analgesic properties, including Chenopodium alba, Ephedra aurantiaca, Ephedra distachya and others. Skin diseases can be treated with 34 types: Ferula foetida, Acroptilon repens, Anabasis aphylla, Camphorosma lessingii and others. Other pharmacological properties are noted in 104 species.

Species growing in the Mangystau region are not equivalent in the prevalence, area and density of growth formed by raw materials. In this regard, some species can be taken from nature in significant volumes

and used by humans, others — in a limited amount, others — are not subject to removal from nature for any reason. In this regard, according to the results of field studies, all identified wild medicinal plants were divided into 4 categories by the degree of prevalence, area of thickets and the possibility of stock collection of plant raw materials:

1. Species with a wide habitat (raw materials reserves over 5 tons), forming significant natural thickets and suitable for industrial harvesting of raw materials. They are: Ferula foetida, Artemisia lercheana, Anabasis aphylla, Anabasis salsa, Salicornia europaea, Alhagi persarum, Alhagi pseudoalhagi, Peganum harmala, Rheum tataricum (in total — 10 species).

2. Species with a wide habitat, forming small natural thickets and suitable for harvesting raw materials for the needs of the local pharmacy chain (raw materials reserves from 1 to 5 tons). These are: Asparagus blestlerianum, Ferula karelinii, Artemisia sublessingiana, Artemisia sanlinifolia, Artemisia scoparia, Chondrilla juncea, Cirsium vulgaris, Echinops ritro, Xanthium strumarium, Descurainia sophia, Lepidium crassifolia, Lepidium latifolium, Syrenia sessiliflora, Capparia spinosa, Gypsophila paniculata, etc. Total — 50 species.

3. Species with a wide habitat, however, growing sporadically and not forming natural thickets suitable for collecting raw materials. Among them: Amaranthus blitoides, Amaranthus retroflexus, Eryngium planum, Falcaria vulgaris, Ferula caspica, Scandix stellata, Zozima absinthifolia, Acroptilon repens, Artemisia austriaca, Artemisia sieversiana, Artemisia songarica, Carthamus lanatus, Cichorium intybus, Inula britanica, Koelpinia linearis, Lactuca serriola, Microcephala lamellata, Tripolium vulgare, Argusia sibirica, Arnebia decumbens, Asperugo procumbens, Onopordum acanthium, Buglossoides arvensis, Cynoglossum officinale, Rindera tetraspis, Cardaria draba and others. Total 111 species.

4. Species with conservation status, that is, rare; endangered, endemic plant species: Lonicera tatarica, Salsola richteri, Dryopteris filix-mas, Morus alba, Elaeagnus angustifolia, Papaver pavonicum, Clematis orientalis, Agrimonia asiatica, Rosa laxa, Crataegus ambigua, Ziziphora tenuior. These species are either included in the list of rare and endangered species, or their ranges have recently been greatly reduced, and taxa themselves need to be preserved in nature and culture. Total — 15 species.

According to the results of field studies, the distribution and raw materials of 11 species of medicinal plants were studied: Rheum tataricum, Ferula foetida, Anabasis aphylla, Peganum garmala, Ephedra distachya, Alhagi pseudalhagi, Meristotropis triphylla, Nepeta cataria, Mentha longifolia, Ziziphora tenuior, Anabasis salsa (Table 2).

Table 2

Stocks of raw materials of some wild medicinal plants of Mangystau region (on air-dry weight)

Name of species	Place of gathering	Gathering parts of plant	Square, hectares	harvest, tons/ha	Exploitation stock, tons	Volume of annual possible gathering of raw material, tons
1	2	3	4	5	6	7
Rheum tataricum	107 km from Aktau city in direction to Senek settlement	Roots	2400	30,0	72000	7200
Ferula foetida	Sand Tuyesu	Roots	600	3,0	1800	180
Anabasis aphylla	Northern Aktau	Grass	1080	2,1	2258,2	1354,3
	Wintering Zhambyl, 63 km from the city of Aktau, not reaching gorge Southern Aktau		3240	2,4	777,6	466,6
	Total:		**4320**		**3035,8**	**1820,9**
Peganum garmala	Southern Aktau, gorge Karaturan	Grass	150	4,6	690	345
Ephedra distachya	Coast of the Caspian Sea, approx. Aktau city	Grass	480	3,05	1464	586
Meristotropis triphylla	Northern Aktau	Grass	9,2	4,6	4,2	2,5
	Beginning of the North Aktau ridge		0,5	4,6	2,3	1,4
	Total:		**9,7**		**6,5**	**3,9**

Continuation of Table 2

1	2	3	4	5	6	7
Nepeta cataria	Southern Aktau, gorge Karaturan	Grass	200	0,3	60	36
Mentha longifolia	Tunkaragan rayon, boundary Tamshaly	Grass	1,0	2,4	2,4	1,4
	Western Karatau, gorge Akmysh		0,8	2,4	1,9	1,3
	Total:		**1,8**	**4,8**	**4,1**	**2,7**
Ziziphora tenuior	Western Karatau, gorge Zhanasai	Grass	100	0,15	1,5	0,9
Alhagi pseudalhagi	Western Karatau	Grass	0,9	3,7	6,3	1,9
	District gorge Tamshaly		33,4	2,3	76,8	30,7
	Total:		**34,3**	**6,0**	**83,1**	**32,6**
Anabasis salsa	Surrounding settlement Taushik	Grass	11,1	0,8	8,9	4,5

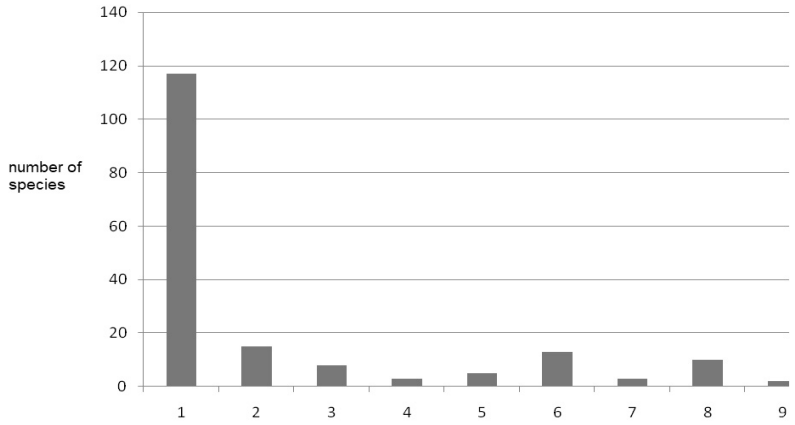
When planning complex or single procurement measures, one of the necessary conditions is knowledge of the exact dates, phases and periods of collection of medicinal vegetative raw materials. We conducted the rhythms of development of medicinal plants, which made it possible to compile a calendar of optimal dates for collecting above-ground and underground organs for a number of medicinal species in the Mangystau region.

The results of the analysis of the collection calendar made it possible to determine that 9 types of raw materials can be harvested in Mangystau: grass, leaves, inflorescences, roots and rhizomes, shoots, bulbs, bark, seeds, juice and fruits (Table 3).

Table 3

Names of raw materials and number of medicinal plant species in Mangystau region

Name of raw material	Amount of species, piece
Grass	120
Roots and rhizomes	15
Shoots	8
Inflorescences	3
Juice	5
Leaves	13
Bulbs	3
Seeds and fruits	10
Burk	2

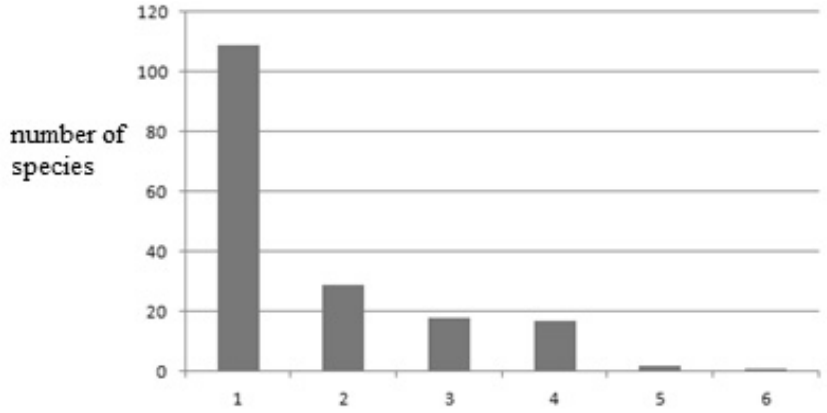


Kind of raw materials: 1 — grass; *2* — roots and rhizomes; *3* — shoots (twigs); *4* — inflorescences; *5* — juice; *6* — leaves; *7* — bulbs; *8* — fruits and seeds; *9* — bark

Figure 3. The volumes of gathering of medicinal raw materials by names

The largest number of species falls on such a type of medicinal raw material as grass — 120 species. The second position is occupied by underground organs (roots and rhizomes) — 15 species. The third place is occupied by leaves — 13 species. The remaining types of raw materials can be collected from a small number of medicinal plants, from 2 to 10 species (Fig. 3).

The largest amount of vegetative raw materials is harvested in the flowering phase (109 names), in the fruiting phase — 17 species, vegetation — 29 species, blossoming — 18 items, death of above-ground organs — 9 species, the beginning of juice movement — 2 species, sporulation — 1 taxon (Fig. 4).



Phase of vegetation: *1* — flowering; *2* — vegetation; *3* — blossoming; *4* — fructification; *5* — start of juice movement; *6* — sporulation

Figure 4. Distribution of medicinal plant species of Mangystau region by vegetation phases required for raw materials harvesting

As a result, the species of medicinal plants we divided into groups on the frequency of collection during the growing season (Tab. 4).

Table 4

Frequency of collection of medicinal plants in the Mangystau region during the growing season

Period of gathering	Months	Amount of gathering species, piece
Early spring	March	1
Average spring	April	16
Late spring	May	27
Early summer	June	85
Average summer	July	78
Late summer	August	46
Autumn	September	12
	October	7
Late autumn	November	1

The results are shown that in the territory of Mangyshlak in March it was possible to harvest 1 species of raw materials, in April — 15 species, in May — 26 species, in June — 84 species, in July — 78 species, in August — 46 species, in September — 12 species, in October — 7 species, in November — 1 species.

Conclusion

Thus, of the 166 identified species of medicinal plants in the Mangystau flora, the largest part belongs to the species used in folk medicine — 144 taxa. Slightly fewer species for which some pharmacological properties have been found — 50 species; 36 species are included in the Pharmacopoeia of the Republic of Kazakhstan. All species were ranked into 10 groups of pharmaceutical-therapeutic activity for use in the treatment of diseases: gastrointestinal tract, oral cavity, kidneys and urinary tract, respiratory tract, antipyretic and anti-inflammatory, cardiovascular system, diabetes mellitus, analgesic and wound healing, skin organs, other diseases.

4 groups of medicinal plant species were ranked according to the degree of distribution, area of thickets and the ability of the stock to collect plant raw materials: 1) species with a wide habitat (raw materials reserves over 5 tons) — 10 taxa; 2) species having a wide habitat, forming small natural thickets and suitable for harvesting raw materials for the needs of the local pharmacy chain (raw materials reserves from 1 to 5 tons) — 50 taxa; 3) species having a wide habitat, however, growing sporadically and not forming natural thickets suitable for collecting raw materials — 111 taxa; 4) species with a protective status — 15 taxa.

The gathering calendar has been compiled for 166 species of medicinal plants in the flora of the Mangystau region. The obtained data can be used for organization of systematic harvesting of vegetal raw materials and development of environmental measures.

The research was carried out within the framework of earmarked funding programme «Development of scientific, practical and computer-informational foundations for the creation of landscape-collection and garden-park plantations in the desert zone of Mangystau for the conservation and rational use of plant biodiversity».

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Маңғыстау облысының жабайы өсетін дәрілік өсімдіктерін зерттеу қорытындысы

Маңғыстау облысының флорасының дәрілік өсімдіктерін зерттеу, медициналық және фармацевтикалық өнеркәсіптерде өсімдік шикізаттарын пайдалану перспективасы және толық түрлік құрамын бағалау практикалық қызығушылық тудырады. 2013–2020 жылдар аралығында дәрілік өсімдіктердің түрлік құрамы, олардың ранжирленуі, шикізат қорлары және негізгі вегетациялық фазалардың өту ерекшеліктері анықталып, далалық зерттеулер жүзеге асырылды. Мақалада Маңғыстаудың табиғи жағдайында табиғи өсетін дәрілік өсімдіктердің түрлік құрамын талдау және оларды саралау нәтижелері келтірілген. Нәтижесінде дәрілік өсімдіктердің тізімі 43 тұқымдастан, 112 туыстан тұратын 166 түрді құрады. Түрлердің басым бөлігі *Asteraceae, Chenopodiaceae, Fabaceae, Brassicaceae, Lamiaceae, Apiaceae, Scrophulariaceae, Boraginaceae, Euphorbiaceae и Ranunculaceae.* Дәрілік өсімдіктердің ең көп бөлігі халықтық медицинада пайдаланылатын түрлерге жатқызылған — 144 түр; оның ішінде 50 түрдің фармакологиялық қасиеті бар; 36 түр Қазақстан Республикасының Фармакопеясына қосылған. Барлық өсімдік түрлерін фармакотерапиялық белсенділік бойынша 10 емдеу топқа ранжирлеу жүзеге асырылды: асқазан-ішек жолдары, бүйрек және зәр шығару жолдары, тыныс алу жолдары, қызуды төмендететін және қабынуға қарсы, жүрек-тамыр жүйесі, қант диабеті, ауырсынуды басатын және жараны басатын, тері органдары, басқа да аурулар. Дәрілік өсімдіктер түрлерінің таралу дәрежесі, шикізат қорының ауданы және оны жинау мүмкіндігі бойынша 4 топқа саралау орындалды. Маңғыстау облысының дәрілік өсімдіктер флорасының 166 түрін үшін жинау күнтізбе бекітілді. Алынған деректер өсімдік шикізатын жоспарлы дайындауды ұйымдастыру және табиғатты қорғау іс-шараларын әзірлеу үшін пайдаланылуы мүмкін.

Кілт сөздер: дәрілік өсімдіктер, Маңғыстау, перспективалық, жинау күнтізбесі, шикізат қорлары, фармакологиялық белсенділік, ресми және халықтық медицинада пайдалану.

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Итоги изучения дикорастущих лекарственных растений Мангистауской области

Исследование лекарственных растений флоры Мангистауской области представляет практический интерес для оценки полного видового состава и перспектив использования растительного сырья для медицинской и фармацевтической промышленности. В течение 2013–2020 гг. были осуществлены полевые обследования с выявлением видового состава лекарственных растений, их ранжирования, сырьевых запасов и особенностей прохождения основных фаз вегетации. В статье приведены результаты анализа видового состава естественно произрастающих лекарственных растений в природных условиях Мангистау и их ранжирование. В результате перечень лекарственных растений составил 166 видов из 112 родов и 43 семейств. Преобладающее число видов отнесено к семействам *Asteraceae, Chenopodiaceae, Fabaceae, Brassicaceae, Lamiaceae, Apiaceae, Scrophulariaceae, Boraginaceae, Euphorbiaceae* и *Ranunculaceae.* Наибольшая часть лекарственных растений отнесена к видам, используемым в народной медицине, — 144 видов; для 50 видов обнаружены фармакологические свойства; 36 видов включены в Фармакопею Республики Казахстан. Осуществлено ранжирование всех видов по фармако-терапевтической активности на 10 групп для лечений: желудочно-кишечного тракта, ротовой полости, почек и мочевыводящих путей, дыхательных путей, жаропонижающее и противовоспалительное, сердечно-сосудистой системы, сахарного диабета, обезболивающее и ранозаживляющее, органов кожи и прочих заболеваний. Выполнено ранжирование видов лекарственных растений на 4 группы по степени распространенности, площади зарослей и возможности запаса по сбору раститель-

ного сырья. Составлен календарь сбора для 166 видов лекарственных растений флоры Мангистауской области. Полученные данные могут быть использованы для организации планомерной заготовки растительного сырья и разработки природоохранных мероприятий.

Ключевые слова: лекарственные растения, Мангистау, перспективность, календарь сбора, сырьевые запасы, фармакологическая активность, использование в официальной и народной медицине.

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