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About floristic records of the Mangystau flora

This article presents the geographical novelties of the Mangystau flora discovered during the botanical expedition in 2023. One of the oasis territories of the Mangistau desert is the mountainous and foothill strips of the mountainous Karatau. For the first time, three species of woody plants, *Prunus spinosa* L., *Rosa iliensis* Chrshan, *Armeniaca vulgaris* L. from the family *Rosaceae* Juss, were found in the gorges of Kogez, Akmysh, Samal of the Mountain Karatau in the valleys of streams and along the slopes of the mountains. Thickets of bushes *Prunus spinosa* L. and endemic species of South Kazakhstan *Rosa iliensis* Chrshan occupy an area from 100 to 200 m² and there are several single specimens of a rare and endemic species with a decreasing range of *Armeniaca vulgaris* L several specimens. All species are in good condition, plants have a high vitality, and no signs of damage were noted. *Prunus spinosa* and *Rosa iliensis* also showed abundant flowering and fruiting.

Keywords: tree species, rare and endemic species, Mangistau deserts, mountainous Karatau, gorges, flora of Kazakhstan.

Introduction

The Mangystau desert is located on lowlands and plains. The height ranges from -23 m below sea level on the coast of the Caspian Sea, up to -132 m in the Karagiye depression, and up to +300+550 m above sea level on the remnant mountain elevations. Four large geomorphological regions are distinguished on the territory of Mangystau: Mountain Mangyshlak, plain Mangyshlak, lowland plain Bozashi, and Ustyurt plateau [1]. The flora of the Mangystau region belongs to a typical desert type formed under the influence of characteristic arid areas.

In 2004-2006, during the implementation of the project "State Plant Cadastre of Mangystau region", the floral composition of plants was clarified. A monographic work on vascular plants of the region was published, which included 675 species from 300 genera and 69 families. At the same time, the list of rare and in need of plant protection, numbering 40 species, was clarified and expanded [2].

In 2009, two geographically new species of the Mangystau flora were collected and described: *Corydalis schanginii* (Pall.) B. Fedtsch. and *Gagea ova* Stapf. Both species were collected on the Western Chinka of the Ustyurt plateau [3].

As a result of floristic field studies for 2010-2021, additional new geographical novelties from 14 species for the flora of Mangystau were discovered: *Artemisia sieversiana* Willd., *Ribes aureum* Pursh, *Tulipa gerneriana* L. (*T. schrenkii* Regel), *Malus siversii* (Ledeb.) M. Roem., *Urtica dioica* L., *Epilobium hirsutum* L., *Rosa canina* L., *Portulaca oleracea* L., *Hordeum murinum* L., *Hordeum murinum* L., *Atriplex verrucifera* M. Bieb. One plant (*Cakile maritima* subsp. *euxina* (Pobed.) Nyar.) was a new species for the Flora of Kazakhstan. These species were mainly collected on the Mangyshlak peninsula in the Mountainous Karatau, one – on the coast of the Caspian Sea, and 3 species – on the Western Chink of the Ustyurt plateau [4-5].

In this paper, in addition to previous research results, we presented the geographical novelties for the Mangystau flora discovered during the botanical expedition in 2023.

Experimental

During the botanical expeditions in 2023, three geographical new species for the Mangystau flora from the *Rosaceae* Juss. family were collected: *Prunus spinosa* L., *Rosa iliensis* Chrshan., and *Armeniaca vulgaris* L. Field research was carried out by the route-reconnaissance method. Herbarium samples of the collected species are stored in the Mangyshlak Experimental Botanical Garden (MEBG) herbarium. The species' general habitat and the taxa's Latin names are given by POWO (Plants of the World Online) data [6].

The species were determined according to the summary “Flora of Kazakhstan” [7], the Latin names of plants according to the summary by S.K. Cherepanov [8]. The floristic zoning proposed according to the “Flora of Kazakhstan” summary.

Results and Discussion

One of the oasis territories of the Mangystau desert is the mountainous and foothill bands of the mountainous Karatau. Karatau is divided into Western and Eastern mountains, represented by elevations elongated in the sub-latitudinal direction. Karatau's total length does not exceed 90 km; each hill is 45 km long, with average absolute heights of 300-400 m; the highest points are 532 and 556 m (Otpan and Beshoky mountains). A characteristic feature of the Western and Eastern Karatau ridges is the presence of a well-defined leveling surface, composed of stable metamorphic rocks of the Permian-Triassic. The mountains of the Western and Eastern Karatau gorges are caused by the presence of territories with a close occurrence of groundwater self-draining springs of fresh water, which allow the formation of a rich vegetation cover.

On the slopes of the mountains between the rocks along the banks of a flowing spring stream, trees grow on a single specimen – *Elaeagnus angustifolia* is widely distributed by thickets of *Crataegus ambigua*, in places *Rubus caesius*, in deep-cut gorges with rocky slopes there are individual bushes of *Rhamnus sinensis*.

In the summer of 2023, during fieldwork in the Kogez, Akmysh, and Samal gorges in the ridges of the mountainous Western Karatau, we first discovered thickets of bushes of *Prunus spinosa* L. and the endemic species *Rosa iliensis* Chrshan, several specimens of a rare and endemic species with a shrinking range of *Armeniaca vulgaris* L. on the slopes of the mountains and the valley of streams.

Prunus spinosa is a highly branched, very prickly shrub. Thorn thickets were found among the rising rocks in the Kogez, Samal, and Karatau gorges 10-15 km east of the Shaiyr village (Fig. 1). They grow in plots from 20 to 30 m long and 3-4 m wide, and in places, they occur in separate patches of area in sizes 5x3 m 10x5 m. The appearance of the thorn in the gorges is in good condition; the plants have high vitality, and there are no signs of damage. The height of the bush is 2.5-3.5 m, well-leafed, thick. It bears fruit abundantly, fruits of medium size, length 1.3-1.5 cm, width 1-1.3 cm. Blooms in April-May, bears fruit in July-August.

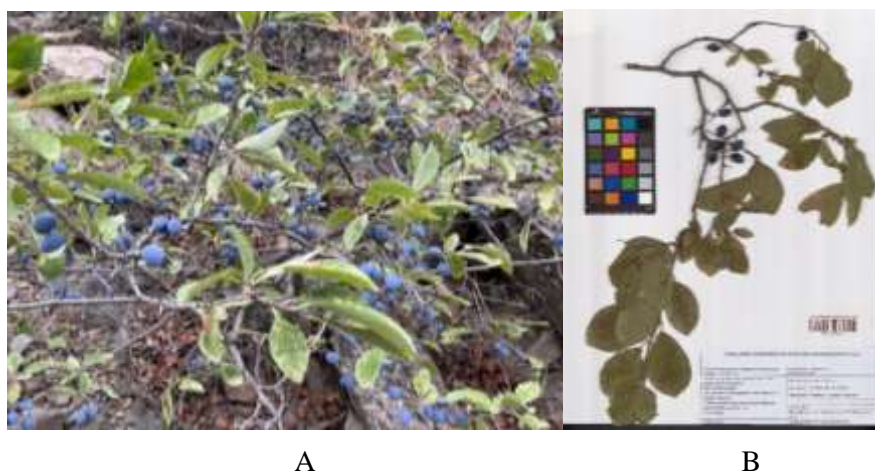


Figure 1. *Prunus spinosa*: A – sample in nature; B – herbarium specimen

The range covers Europe, North Africa, Western Asia [9] and Western Siberia [10]. In the “Flora of the south-east of the European part of the USSR”; the areas of the Volga River delta, the Astrakhan steppe; the Orenburg and Ural counties are given [11], the northern border runs from 68° on the Scandinavian Peninsula through southwestern Finland [12]. According to V.D. Gorodetskii [13], as well as according to the “Flora of Turkmenistan” [14], blackthorn is not found in Central Asia; Asia Minor and Iran are given in the “Flora of Kazakhstan”. In Kazakhstan, it is located in the floristic areas of the spurs of the Common Syrt, Mugodzhara, and the Caspian along the Ural River [7]. Earlier, it was noted about the growth of blackthorn in Western Karatau [15], but it is not included in the list of flora of Mangystau [2].

New location: Mangyshlak floral district: Mangystau region, Mangystau district, Western Karatau Mountains, Kogez Gorge. N 44°12'155", E 52°01'174", 257 m above sea level. 15.VII.2023. A.A. Imanbayeva, N.I. Duissenova (determined by A.A. Imanbayeva); Mangistau region, Mangistau district, Western Karatau Mountains, Samal gorge; N 44°12'57.1", E 51°59'37,5", 249 m above sea level. 15.VII.2023. A.A. Imanbayeva, N.I. Duissenova (determined by A.A. Imanbayeva)

There is an assumption that the blackthorn was brought to Mangyshlak by birds from the Northern Caspian Sea since the main routes of their seasonal migrations pass along the eastern shores of the Caspian Sea [15].

Rosa iliensis is a dense shrub with semi-branching branches. Thickets of bushes grow in the stream valley and on rocky slopes in the Kogez of Western Karatau gorges (Fig. 2).



Figure 2. *Rosa iliensis* Chrshan.: A – sample in nature; B – herbarium specimen

The shrub's height is 2.5 m, and the branches climbing along the nearby trees of the narrow-leaved loch reach up to 7 m. Its area is from 5 m to 8 m long, 3-4 m wide in several sections. In the thickets, the number of adult plants is 12-20 pcs, an average of 7-15 pcs, and more than 30 pcs of young root seedlings. The plants are well-leafy dense. It bears fruit abundantly; the fruit is smooth, spherical, black, 5-6 mm in diameter. Blooms in May-October, fruits ripen in August-October. The plant was discovered during flowering and fruit ripening. This species was first described in 1947 by V.G. Hrzhanovsky from the Ili River valley of the Almaty region [16-17]. *Rosa iliensis* Chrshan. It grows along the banks of desert rivers on the sands in the Muyunkum and Balkhash-Alakul floristic areas [7]. The species is one of the endemic plant species of the flora of Kazakhstan, which is under threat of extinction since the size of its distribution has sharply decreased in the last 45-50 years due to anthropogenic influences [18].

New location: Mangyshlak floral district: Mangystau region, Mangystau district, Western Karatau Mountains, Kogez Gorge. N 44°12'155", E 52°01'174", 257 m above sea level. 15.VII.2023. A.A. Imanbayeva, N.I. Duissenova (determined by A.A. Imanbayeva, G.Zh. Dosschieva).

Armeniaca vulgaris L. is a 5-7 m tall tree. It grows in a single specimen in the valley of streams and on the rocky slopes of the gorge in Kogiz and Kamysh of Western Karatau. Plant height 5-7 m, crown diameter 6 m. According to the appearance assessment, the apricot trees are in good condition, not damaged by diseases and pests.

A rare and endemic species of the Tien Shan apricot is expected in the Flora of Kazakhstan, the distribution area is the floral areas of the Dzungarian Alatau, Zailiysky Alatau, Ketmen-Tersken Alatau, Western Tien Shan [7].

New location: Mangyshlak floral district: Mangystau region, Mangystau district, Western Karatau Mountains, Kogez Gorge. N 44°12'155", E 52°01'174", 257 m above sea level. 15.VII.2023. A.A. Imanbayeva, N.I. Duissenova (determined by A.A. Imanbayeva); Mangistau region, Mangistau district,

Western Karatau Mountains, Akmysh gorge: N 44°12'15.5", E 52°01'17.4", 253 m above sea level. 05.VIII.2023. A.A. Imanbayeva, N.I. Duissenova (determined by A.A. Imanbayeva) (Fig. 3).



Figure 3. *Armeniaca vulgaris* L.: A – sample in nature; B – herbarium specimen

Conclusion

During the botanical expeditions in 2023, three species of woody plants, *Prunus spinosa* L., *Rosa iliensis* Chrshan, and *Armeniaca vulgaris* L. from the family *Rosaceae* Juss. as geographical novelties for the flora of Mangystau were discovered for the first time. The growth of this species was noted in the Kogez, Akmysh, and Samal gorges of the Mountain Karatau in the valleys of streams and along the slopes of mountains. Thickets of *Prunus spinosa* bushes and the endemic species *Rosa iliensis* cover an area of 100 to 200 m². The plants are well-leaved, dense, and abundantly fruited. A rare and endemic species of *Armeniaca vulgaris* was found in single specimens in the gorge in Kogez and Akmysh of Western Karatau. The plants are in good condition and not damaged by diseases and pests.

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References

- 1 Сафронова И.Н. Пустыни Мангышлака. (Очерк растительности) / И.Н. Сафронова. — СПб., 1996. — 211 с.
- 2 Аралбай Н.К. Государственный кадастр растений Мангистауской области. Список высших сосудистых растений / Н.К. Аралбай, Г.М. Кудабаева, А.А. Иманбаева и др. — Актау, 2006. — 301 с.
- 3 Иманбаева А.А. Дополнения к флоре Мангышлака / А.А. Иманбаева, И.Н. Сафронова // Изв. НАН РК. Сер. биол. и мед. — 2010. — № 2. — С. 115, 116.
- 4 Imanbayeva A.A. Floristic records in the Mangystau region (Western Kazakhstan) / A.A. Imanbayeva, S.A. Kubentayev, D.T. Alibekov, M.Yu. Ishmuratova, A.B. Lukmanov // Turczaninowia. — 2022. — Vol. 25 (2). — P. 151-154. <https://doi.org/10.14258/turczaninowia.25.2.14>

- 5 Imanbayeva A.A. Geographical innovations in the flora of the Mangystau region / A.A. Imanbayeva, M.Yu. Ishmuratova, G.G. Gassanova // BIO Web of Conferences "Plant Diversity: Status, Trends, Conservation Concept. — 2020. — Vol. 24. <https://doi.org/10.1051/bioconf/20202400028>
- 6 POWO. Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. — [Electronic resource]. 2021. — Access mode: <http://www.plantsoftheworldonline.org>
- 7 Флора Казахстана. — Алма-Ата: Наука, 1961. — Т. 4. — 546 с.
- 8 Черепанов С.К. Сосудистые растения России и сопредельных государств (в пределах бывшего СССР) / С.К. Черепанов. — СПб., 1995. — 990 с.
- 9 Rehder A. Manual of cultivated trees and shrubs / A. Rehder. — New York, 1949. — 600 p.
- 10 Жуковский П.М. Культурные растения и их сородичи / П.М. Жуковский. — М.: Колос, 1950. — 790 с.
- 11 Флора юго-востока Европейской части СССР. — Вып. 4. — Л.: Изд-во АН СССР, 1931. — 242 с.
- 12 Деревья и кустарники СССР. Дикорастущие, культивируемые и перспективные для интродукции. — Т. 3. — М.– Л.: Изд-во АН СССР, 1954. — С. 256–815.
- 13 Городецкий В.Д. Пособие по дендрологии для Средней Азии / В.Д. Городецкий. — Ташкент: Образование, 1934. — 323 с.
- 14 Флора Туркмении. — Т. 4. — Ашхабад: Туркмен. филиал АН СССР, 1949. — 364 с.
- 15 Матюшенко А.Н. О произрастании терна в горном Мангышлаке / А.Н. Матюшенко, К.К. Давлетбаев // Бюлл. Гл. бот. сада. — 1981. — Вып. 120. — С. 26, 27.
- 16 Хржановский В.Г. Розы. Филогения и систематика. Спонтанные виды Европейской части СССР, Крыма и Кавказа. Опыт и перспективы использования / В.Г. Хржановский. — М.: Сов. наука, 1958. — 497 с.
- 17 Хржановский В.Г. Шиповники Казахстана / В.Г. Хржановский // Народное хозяйство Казахстана. — 1941. — № 5. — С. 21–24.
- 18 Аметов А. Трансформация флоры и растительного покрова в нижнем течении реки Или (ниже Капчагайской ГЭС) / А. Аметов, А. Чилдибаева, Н. Сулейменова, Г. Елепбай // Вестн. Казах. нац. ун-та. Сер. эколог. — 2018. — № 3 (56). — С. 115–124.

А.А. Иманбаева, Н.И. Дуйсенова, А.Б. Лукманов, Г.Ж. Досшиева, Г.Г. Гасанова

Маңғыстау флорасындағы географиялық жаңалықтар туралы

Мақалада Маңғыстау флорасы үшін географиялық жаңалықтарды ашу бойынша 2023 жылғы ботаникалық экспедициялардың нәтижелері берілген. Шөлді Маңғыстаудың оазистік аумақтарының бірі — Қаратау тауының таулы және тау бөктеріндегі белдеулері. Көгез, Ақмыш, Самал шатқалдарында, Қаратаудың таулы, бұлақ аңғарларынан және тау бөктерінен алғаш рет *Rosaceae* Juss тұқымдасының ағаш өсімдікті үш түрі — *Prunus spinosa* L., *Rosa iliensis* Chrshan, *Armeniaca vulgaris* L. табылды. Қалың бұталы өскен *Prunus spinosa* L. және Оңтүстік Қазақстанның эндемикалық түрі *Rosa iliensis* Chrshan тау шатқалдарында 100-ден 200 м²-ге дейінгі аумақты алып жатыр. Сонымен қатар *Armeniaca vulgaris* L. таралу аймағы азайып бара жатқан сирек және эндемикалық түрлердің жалғыз үлгілері бар. Барлық түрлер жақсы жағдайда, өсімдіктердің өміршеңдігі жоғары, зақымдану белгілері жоқ. *Prunus spinosa* және *Rosa iliensis* түрінің жақсы гүлденгені және жеміс беруі байқалды.

Кілт сөздер: ағаш түрлері, сирек және эндемикалық түр, шөлді Маңғыстау, Қаратау таулы аймағы, шатқалдар, Қазақстан флорасы.

А.А. Иманбаева, Н.И. Дуйсенова, А.Б. Лукманов, Г.Ж. Досшиева, Г.Г. Гасанова

О географических новинках во флоре Мангистау

В статье приведены результаты ботанических экспедиций 2023 года о находке географических новинок для флоры Мангистау. Одним из оазисных территорий пустыни Мангистау является горная и предгорная полосы горного Каратау. Впервые обнаружены три вида древесных растений: *Prunus spinosa* L., *Rosa iliensis* Chrshan, *Armeniaca vulgaris* L. из семейства *Rosaceae* Juss. в ущельях Көгез, Ақмыш, Самал, горного Каратау, в долинах ручьев и по склонам гор. Заросли кустов *Prunus spinosa* L. и эндемичный вид Южного Казахстана *Rosa iliensis* Chrshan занимают площадь от 100 до 200 м², и встречаются единичные экземпляры редкого и эндемичного вида с сокращающимся ареалом *Armeniaca vulgaris* L. Все виды в хорошем состоянии, растения имеют высокую жизнеспособность, признаков повреждений не отмечено. Наблюдалось обильное цветение и плодоношение у *Prunus spinosa* и *Rosa iliensis*.

Ключевые слова: древесные виды, редкий и эндемичный вид, пустыни Мангистау, горный Каратау, ущелья, флора Казахстана.

References

- 1 Safronova, I.N. (1996). *Pustyni Mangyshlaka (Oчерk rastitelnosti) [Deserts of Mangyshlak (Sketch of vegetation)]*. Saint-Petersburg [in Russian].
- 2 Aralbai, N.K., Kudabaeva, G.M., & Imanbaeva, A.A., et al. (2006). *Gosudarstvennyi kadastr rastenii Mangistauskoj oblasti. Spisok vysshikh sosudistykh rastenii [State Cadastre of Plants of Mangistau Region. List of higher vascular plants]*. Aktau [in Russian].
- 3 Imanbaeva, A.A., & Safronova, I.N. (2010). Dopolneniia k flore Mangyshlaka [Additions to the flora of Mangyshlak]. *Izvestiia NAN RK. Serii biologicheskaja i meditsinskaja — Proceeding of National Academy of Science. Series Biol & Med.*, 2, 115, 116 [in Russian].
- 4 Imanbayeva, A.A., Kubentayev, S.A., Alibekov, D.T., Ishmuratova, M.Yu., & Lukmanov, A.B. (2022). Floristic records in the Mangystau region (Western Kazakhstan). *Turczaninowia*, 25(2); 151-154. <https://doi.org/10.14258/turczaninowia.25.2.14>
- 5 Imanbayeva, A.A., Ishmuratova, M.Yu., & Gassanova, G.G. (2020). Geographical innovations in the flora of the Mangystau region. *BIO Web of Conferences "Plant Diversity: Status, Trends, Conservation Concept"*, 24. <https://doi.org/10.1051/bioconf/20202400028>
- 6 POWO (2021). *Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew*. Retrieved from <http://www.plantsoftheworldonline.org>
- 7 (1961). *Flora Kazakhstana [Flora of Kazakhstan]*. Alma-Ata: Nauka, 4, 546 [in Russian].
- 8 Cherepanov, S.K. (1995). *Sosudistye rasteniia Rossii i sopredelnykh gosudarstv (v predelakh byvshego SSSR) [Vascular plants of Russia and neighboring countries (within the former USSR)]*. Saint Petersburg [in Russian].
- 9 Rehder, A. (1949). *Manual of cultivated trees and shrubs*. New York.
- 10 Zhukovskii, P.M. (1950). *Kulturnye rasteniia i ikh sorodichi [Cultural plants and their relatives]*. Moscow: Kolos [in Russian].
- 11 (1931). *Flora yugo-vostoka Evropeiskoi chasti SSSR [Flora of south-east of European part of USSR]*. Leningrad: Izdanie Akademii nauk SSSR, 4, 242 [in Russian].
- 12 (1954). Derevia i kustarniki SSSR. *Dikorastushchie, kultiviruemye i perspektivnye dlia introduksii [Trees and shrubs of USSR [Wild, cultivated and perspective for introduction]]*. Moscow–Leningrad: Izdatel'svo Akademii nauk SSSR, 3, 256–815 [in Russian].
- 13 Gorodetskii, V.D. (1934). *Posobie po dendrologii dlia Srednei Azii [Guide by dendrology for Central Asia]*. Tashkent: Obrazovanie [in Russian].
- 14 (1949). *Flora Turkmenii [Flora of Turkmenia]*. Ashkhabad: Turkmenskii filial Akademii nauk SSSR, 4; 364 [in Russian].
- 15 Matiushenko, A.N., & Davletbaev, K.K. (1981). O proizrastanii terna v gornom Mangyshlake [On the growth of plums in mountainous Mangyshlak]. *Biulleten Glavnogo botanicheskogo sada — Bulletin of Main Botanical Garden*, 120; 26, 27 [in Russian].
- 16 Khrzhanovskii, V.G. (1958). Rozy. Filogeniia i sistematika. Spontannye vidy Evropeiskoi chasti SSSR, Kryma i Kavkaza. Opyt i perspektivy ispolzovaniia [Roses. Phylogeny and systematics. Spontaneous species of the European part of the USSR, Crimea and Caucasus. Experience and prospects of utilization]. Moscow: Sovetskaia nauka [in Russian].
- 17 Khrzhanovskii, V.G. (1941). Shipovniki Kazakhstana [Roses of Kazakhstan]. *Narodnoe khoziaistvo Kazakhstana — National economy of Kazakhstan*, 5, 21–24 [in Russian].
- 18 Ametov, A., Childibaeva, A., Suleimenova, N., & Elepbai, G. (2018). Transformatsiia flory i rastitelnogo pokrova v nizhnem techenii reki Ili (nizhe Kapchagaiskoj GES) [Transformation of flora and vegetation cover in the lower reaches of the Ili River (below Kapchagai Hydro Power Station)]. *Vestnik Kazakhskogo natsionalnogo universiteta. Serii ekologicheskaja — Bulletin of the Kazakh National University. Series ecological*, 3 (56), 115–124 [in Russian].