

RESEARCH ARTICLE

Comparative analysis of floristic lists of the desert part of the Syr Darya valley

P.V. Vesselova^{1,2,*}, G.M. Kudabayeva¹

¹*Institute of Botany and Phytointroduction of CS of MES RK
36D, Timiryazev St., Almaty, 050040, Kazakhstan, E-mail: pol_ves@mail.ru*

²*Altai State University, Faculty of Biology
656049, Russia, Barnaul, pr. Lenina 61, E-mail: pol_ves@mail.ru*

Received: 04.11.2018. Accepted: 06.12.2018

Here in comparative aspect the results of studying the species structure of the plant canopy of the Syr Darya valley (within the Kyzylorda region) at the territories with different types and degree of plant canopy destruction are presented in this article. The areas of the explored territories were defined by the purposes and tasks of definite botanical researches. For convenience of perception the sequence of material statement was constructed not in the chronological order of the carried out researches, but in direction of decreasing the area of the investigated territory. Data processing was carried out in two stages. The first stage included definition of a spectrum of the leading families of floristic lists of the investigated territories. The second stage was the comparative analysis of taxonomical structure and the revealed of the species variety of the studied territories of a desert part of the Syr Darya valley.

Keywords: floristic list; desert part of the Syr Darya valley; spectrum of the leading families

Introduction

One of the most burning issues of the present is the exhaustibility of plant resources. This problem is most relevant for arid territories and is connected with a great complex of negative factors (Vesselova, Kudabayeva, Masslova, 2017). The main factors among them are climate warming and anthropogenic loading.

Influence of a human factor in the conditions of arid climate is especially great in the valleys of the rivers; for those territories the high dense of the human population is characteristic. The largest waterway of the desert part of Kazakhstan is the Syr Darya River crossing the Kyzylorda region from the southeast to the northwest.

Features of floristic content of a desert part of the Syr Darya valley are determined, first of all, by its physical-geographic situation. According to the modern scheme of botany-geographical zoning the territory of our researches is located in a subzone of the middle deserts and belongs to the Central-Northern Turan sub province of the Northern-Turan province of the Iran-Turan subarea of the Sahara-Goby desert region (Botanical geography ..., 2003).

In the valley and the delta of the Syr Darya River, the main factor of development of plant canopy is the superficial drain and the related processes of flooding, salinization, bogging, etc. (Ogar, 1999). Nowadays the drain of the river is regulated by hydraulic engineering constructions and is intensively used for economic needs. Our researches demonstrated that the most significant negative impacts onto the plant canopy of the Syr Darya valley were also plowing of lands under sowings of agricultural crops (first of all rice) and the cattle pasture.

Materials and methods

During the work implementation the classical botanical researching methods were applied, including traditional field geobotanical methods (Field geobotany, 1959-1972). Collections of the Herbarium (AA) of the Institute of botany and a phytointroduction of Committee of Science of the Ministry of Education and Science of the Republic of Kazakhstan (AA) were studied. For identification of the gathered material the fundamental floristic reports were used, such as "Flora of Kazakhstan", 1956-1966, "The illustrated determinant of plants of Kazakhstan", 1969, 1972, "Determinant of plants of Central Asia", 1968-1993. Giving the names to plant species was carried out according to S.K. Cherepanov, 1995.

For carrying out the comparative analysis of the floristic lists created by results of versatile botanical researches of flora and plants of the Syr Darya valley, which had been carried out for the last 10 years were used.

During the researches carried out in 2009-2018 period at the territories of the desert part of the Syr Darya valley which are different in the area and the condition of plant communities, the features of their plant cover formation were revealed. In particular the floristic lists were made and the analysis of spectrums of their leading families was carried out (table). Data of other researchers, such as A.B. Baibulov, 2009, L.A. Dimeyeva, B.M. Sultanova and Z.Zh. Alimbetova (Monitoring of Ramsar grounds of the Syr Darya delta, 2014), were also involved into the comparative analysis.

The largest territorial apportionment, which species structure was involved into comparison with floras of other areas, was the Kyzylorda region in general. It is about the abstract of the higher vascular plants of this area (The state inventory of plants of the Kyzylorda region, 2013). Unlike other compared territories the Kyzylorda region includes not only the Syr Darya valley, but also the areas adjoining to it (the northern part of Kyzyl-Kum sands, the southernmost tip of the Betpakdala Desert and the western spurs of the ridge the Syr Darya Karatau).

Among the compared objects belonged directly to the valley of the Syr Darya River the largest area uniting both ancient, and modern valleys. The species structure of this territory was studied within the grant project of the Ministry of Education and Science of the Republic of Kazakhstan (MES RK) "Monitoring the structure of vegetation of livestock stages, the scientific approach of sustainable use of desert pastures of Kazakhstan (on the example of the Kyzylorda region), 2015-2017". On the basis of the materials received during performance of the specified grant also the floristic structure of the territories broken as a result of an intensive cattle pasture within the modern valley was formed (Vesselova, Kudabayeva, Dimeyeva, 2016).

The following floristic list included into comparative analysis, reflects the species structure of the modern valley and delta of the Syr Darya River, it was studied with use of GIS technologies (Baibulov, 2009).

The list of the vascular plants of wetlands of an avandelta and the deltoid lakes of the Syr Darya which entered the list of world value grounds, protected by the International Ramsar conference (Monitoring of Ramsar grounds of the Syr Darya delta, 2014) was used as the next compared object.

The smallest, by area, territory whose floristic list of vegetation was considered by us in comparative aspect was the rice massif of Kazaly district of Kyzylorda area. The investigations of its species structure were carried out within the Scientific project under the contract "LaVaCCa" with the University of "Julius Maximilian" of the Würzburg "Assessment of lands' changing and development of the instrument of support for better planning of use of lands in the irrigated plains of Central Asia" (section: Vegetation of the Forgotten Rice Checks, 2015-2017). Nowadays studying the floristic structure of vegetation of this massif is being continued in the frame of researches of the grant project of the Ministry of Education and Science of the Republic of Kazakhstan "Monitoring researches of the restoration of natural vegetation on the abandoned rice fields of the Kyzylorda area, the prospects of their use 2018-2020".

Thus, in all in comparative analysis the floristic lists of 6 districts (table) were used; their botanical investigations were directed to various purposes.

Results

During our investigations it was revealed that at the studied sites of the Syr Darya valley the main types of vegetation were meadow, meadow-tugai and tugai types (Vesselova, Kudabayeva, Dimeyeva, 2016). In this article one can find their short characteristic made by taking into account the data of field researches. *Elaeagnus oxycarpa* Schlecht., *Populus diversifolia* Schrenk and *P. pruinosa* Schrenk are considered to be the hallmark of wooden tier of the riparian forests of river terraces. *Halimodendron halodendron* (Pall.) Voss., *Tamarix laxa* Willd., *T. ramosissima* Ledeb., *Clematis orientalis* L. and *Cynanchum sibiricum* Willd., etc. are situated in the shrubby tier of the riparian forests of river terraces. At near-riverbed banks the willow riparian forests are formed (*Salix songarica* Anderss., *S. wilhelmsiana* Bieb.). Meadow motley grass of riparian forests and meadow-tugai communities are represented by *Calamagrostis epigeios* (L.) Roth, *Xanthium strumarium* L., *Phragmites australis* (Cav.) Trin. ex Steud., *Lithrum salicaria* L., *Crypsis schoenoides* (L.) Lam., *Argusia sibirica* (L.) Dandy; including halophyte types, such as *Karelinia caspia* (Pall.) Less., *Aeluropus littoralis* (Gouan) Parl.; including various saltwort (*Atriplex tatarica* L., *Salsola nitraria* Pall.). In conditions of near bedding the mineralized ground waters among the vegetable cover *Halostachys belangeriana* (Moq.) Botsch. and *Nitraria schoberi* L. appear.

In meadow type of vegetation of the Syr Darya valley the halophyte meadows which are formed on the lowered plains with the salted meadow soils or meadow saline soils prevail (Baibulov, 2009). In their structure halophyte cereals dominate: species of the *Puccinellia* Parl. genus, such as *P. distans* (Jacq.) Parl., *P. tenuissima* Litv. ex V. Krecz., *P. dolicholepis* V. Krecz., *P. diffusa* V. Krecz., *Aeluropus littoralis*, *Leymus multicaulis* (Kar. et Kir) Tzvel. and also *Phragmites australis*. The types of halophyte motley grass act as subdominant species: *Limonium gmelinii* (Willd.) O. Kuntze, *L. otolepis* (Schrenk) O. Kuntze, *Saussurea salsa* (Pall. ex Bieb.) Spreng., *Karelinia caspia*, and also the annual saltwort species, such as *Suaeda acuminata* (C.A. Mey.) Moq., *S. linifolia* Pall., *Salicornia europaea* L., *Climacoptera aralensis* (Iljin) Botsch., *C. lanata* (Pall.) Botsch.) and some other species.

At the termination of superficial flooding and deepening the ground waters more than for 3 m, the desert meadows are formed; in their communities the phreatophyte motley grass species play a dominating role. They are *Glycyrrhiza glabra* L., *Karelinia caspia*, *Alhagi pseudalhagi* (Bieb.) Fisch., *A. kirghisorum* Schrenk, *Pseudosophora alopecuroides* (L.) Sweet, *Goebelia pachycarpa* (C.A. Mey.) Bunge and some others.

In a zone of influence of irrigation massifs of and on the boards of channels the shrubby meadows prevail, among them the species of *Tamarix* L. genus, such as *T. hispida* Willd., *T. laxa* Willd., *T. ramosissima* Ledeb.), *Halimodendron halodendron*, *Lycium ruthenicum* Murr., *Haloxylon aphyllum* (Minkw.) Iljin and *Krascheninnikovia ceratoides* (L.) Gueldenst. and *K. ewersmanniana* (Stschegl. ex Losinsk.) Grub.

Besides, on all elements of a relief of the Syr Darya valley on soils of the salted row, including second time salted lay lands, the halophyte vegetation was widely presented (Botanical geography..., 2003), including the hyper halophyte species of *Chenopodiaceae* family, such as *Halocnemum strobilaceum* (Pall.) M. Bieb., *Kalidium foliatum* (Pall.) Moq., *K. caspicum* (L.) Ung.-Sternb., *Salsola foliosa* (L.) Schrb., *Atriplex tatarica* L. (Veselova, Kudabayeva, etc., 2017), *Suaeda microphylla* Pall., *S. crassifolia* Pall., *Salicornia europaea*, etc.

For comparison of species structure of various areas, we used also the list of vascular plants of flora of the area in general. Therefore, in brief it is necessary to tell also about other vegetation types which are found in its limits. The northern strip of the area (on a right bank of the Syr Darya) is engaged with vegetation growing at gray-brown soils. Clay slopes and loops of the plateau are covered with pelitophyte biyurgunian communities (*Nanophyton erinaceum* (Pall.) Bunge). Stony eminence plains are occupied with hemipetrophyte complexes with participation of communities of *Salsola arbusculiformis* Drob., *Anabasis salsa* (C.A. Mey.) Benth. ex Volkens, *Nanophyton erinaceum*, *Artemisia terrae-albae* Krasch. and *A. turanica* Krasch. In the north of the region the big areas are occupied with the hemipetrophyte complexes of feather-grassed-white-grounded-black-saltworted, biyurgun and tas-biyurgun communities (with *Stipa richteriana* Kar. et Kir. and *St. kirghisorum* P. Smirn.) of deserts of the Central Kazakhstan. The vegetable cover of the Northern Aral and the northern part of the Saryalan plateau is represented by various complexes of pelitophyte species, such as bluegrass-white-ground-absinthe (with *Poa bulbosa* L.), biyurgunian, black-sagebrushed, (*Artemisia pauciflora* Weber), black-absinthe-biyurgunian, kokpek (*Atriplex cana* C.A. Mey.) and itsegek (*Anabasis aphylla* L.) communities on brown soils. Complexes of hemi psammophyte (sabulous) tysik-white-grounded-sagebrushed (*Stipa sareptana* A. Beck.) and white-grounded-sagebrushed communities are concerned to sabulous soils, partly with participation of the itsegek in combination with black-sagebrushed phytocoenosis.

The vegetation of the northwest edge of mountains of the Syr Darya Karatau is presented in east and northeast outskirts of the area (The map of vegetation of Kazakhstan and Central Asia, within the desert region, 1995). At the northwest slope of the ridge the small sites of mountain ephemeroide-caespitos-cereal steppes are located. The cereal basis is made of *Festuca valesiaca* Gaudin, feather grass (*Stipa lessingiana* Trin. et Rupr., *S. capillata* L., *S. kirghisorum*, *S. caucasica* Schmalh.) and also *Koeleria cristata* (L.) Pers. and *Agropyron pectinatum* (Bieb.) Beauv. The southwest slope, a little bigger on the area, is covered with mountain shrubby and short-grass savannoids (semisavanna) in combination with phryganoid vegetation (mountain xerophyte) on stony slopes. Here a set of trees and bushes is rich, among them are *Amigdalus petunnikowii* Litv., *Pyrus regelii* Rehd., *Atraphaxis pyrifolia* Bunge, *Spiraea hypericifolia* L. *Cerasus erythracarpa* Nevski, *Ephedra equisetina* Bunge. Among them *Carex pachystylis* J. Gay, *Poa bulbosa* and *Ferula tenuisecta* Korov., *Artemisia karataviensis* Krasch. et Abol. ex Poljak., *Cousinia dolicholepis* Schrenk, *Lepidolopha karatavica* Pavl. and *Phlomis salicifolia* Regel, etc. can be constantly met. There are lots of ephemeral plants and ephemeroide there. On stony low-mountains one can find cereal-sagebrush and black-boyalych deserts and their petrophyte series with black boyalych, white-ground sagebrush and Turanian sagebrush, *Stipa richteriana*, *Catabrosella humilis* (Bieb.) Tzvel., *Ephedra intermedia* Schrenk et C.A. Mey. and *Acanthophyllum pungens* (Bunge) Boiss. In piedmont plains clay and sandy deserts of the Western-Tien Shan type containing *Artemisia terrae-albae*, *A. turanica*, *A. diffusa* Krasch. ex Poljakov, *Carex pachystylis* and *Poa bulbosa* are widespread.

To the south from the Syr Darya valley the Kyzyl-Kum sands stretch. Possessing the very various vegetation, great areas of their northern part are occupied with communities with prevalence of *Artemisia terrae-albae* and *Haloxylon aphyllum* with the participation of *Carex physodes* Bieb., *Salsola arbuscula* Pall. and *S. orientalis* S.G. Gmel. on the hilly sands fixed hollow. In the southern part of sands, the vegetation is represented by psammophyte-shrubby-white saxaul communities (*Haloxylon persicum* Bunge ex Boiss.) and wormwood groups on the broken sands. Among the characteristic species it should be noted such species as *Ammodendron conollyi* Bunge, *Calligonum leucocladum* (Schrenk) of Bunge and *C. eriopodum* Bunge, *Carex physodes*, *Poa bulbosa* and the others.

Discussion

When comparing floristic lists, the families possessing the first seven positions in the spectrum of the leading families by quantity were taken in attention. As in certain cases in each line corresponding to a certain place (from the 1st to the 7th) in the spectrum of the leading taxons more than one family can settle down, their total quantity in each list is miscellaneous.

So, in the territory of the Kyzylorda region, according to our investigations (The State Inventory of Plants of the Kyzylorda region, 2013) 1096 species of higher vascular plants relating to 445 genera of 85 families are registered. At the first seven positions the 8 families settled down which compose 63.2% of all species of Kazakhstan flora, among them *Asteraceae*, 190 (17.3%) species; *Chenopodiaceae*, 122 (11.1%) species; *Poaceae*, 92 (8.4%) species; *Brassicaceae*, 86 (7.8%) species; *Fabaceae*, 85 (7.8%) species; *Polygonaceae*, 40 (3.6%); *Cyperaceae*, 40 (3.6%) species and *Boraginaceae* 38 (3.5%) species.

The spectrum of the leading families includes practically all taxonomical groups which are characteristic for desert regions of Kazakhstan. At the same time prevalence in flora of the considered region the representatives of *Asteraceae* family and high position of *Fabaceae* family indicates the artificiality of its allocation. Such artificiality consists in the entry into the area structure not only desert plains, but also mountain territories, namely the southwest extremity of the Syr Darya Karatau ridge. At the same time a spectrum of the leading families, judging by a variety of species of *Chenopodiaceae* family and *Brassicaceae* family, demonstrates the prevalence of desert elements in formation of the vegetable cover of the Kyzylorda region. On this background a considerable number of species of *Cyperaceae* family presented by generally hygrophilous plants and partially representatives of *Poaceae* family, demonstrates the influence onto the structure of flora of intrazonal vegetation of the flood-plain and deltoid sites of the Syr Darya River valley.

In the territories covering both the modern, and the ancient valleys of the Syr Darya River and also the desert sites which are located between them we revealed 401 species of 231 genera and 55 families. The analysis of species structure of flora of this

area confirms its complexity caused by influence of the interconnected factors. The complexity of floristic structure is expressed, as in the presence of the elements which are characteristic of intrazonal inundated vegetation, and in wide representation of placorian species, in particular the psammophyte species of the Kyzyl-Kum coming from the South into the sandy massifs of valleys which were formed in them in the course of historical development. The third, important factor leaving the mark in species structure of flora of the considered area is anthropogenic influence (high concentration of settlements, intensity and multi-vectority of use of natural resources).

The taxonomical analysis of the revealed species demonstrated that the five places among the leading families are headed by the typical for desert floras *Chenopodiaceae* family numbering in its structure 75 (18.7%) species. The second place belonged to *Asteraceae* family, 59 (14.7%) species. The third position belonged to the representatives of *Brassicaceae* family, 56 (14%). Further one can find *Poaceae* family, 45 (11.2%) species and *Fabaceae* family containing 25 (6.2%) species. Species of the listed families compose 64.8% of the species structure revealed in the course of our investigation.

The similar hierarchy of families of flora of the Syr Darya valley in general corresponds to the sequence of a spectrum arrangement of families of desert districts. Indisputable domination of the representatives of *Chenopodiaceae* family which is expressed in a considerable numerical separation from other families testifies about aridity of the studied territory generally, and also proves its optimum for this family. It confirms the allocation of the subzone of average glasswort deserts.

To families listed above the following families adjoin: *Boraginaceae*, 14 (3.5%), species and *Cyperaceae*, 2 (3.0%) species taking sixth and seventh positions respectively. It should be noted the minimum difference in number of species at the *Asteraceae* and *Brassicaceae* families. First of all, it is connected with increase in number of the representatives of *Brassicaceae* due to types of antropofilic character. Thus, the structure of the leading families demonstrates, on the one hand side, typically desert nature of valley flora, and from other feature of formation of its species structure (in particular the significant amount of species of *Poaceae* family and high position this *Cyperaceae*) against the background of an anthropogenic disorder of the studied territory.

Studying only the broken territories of the modern Syr Darya valley as a result of an intensive pasture demonstrated the existence in vegetation structure the 323 species of the higher plants distributed among 154 genera and 55 families. The five of the leading families are composed by the same taxonomical groups, as in the floristic list of all the valley and also in the list of the most multispecies families of rice fallow lands. So, in the considered territory the first place with 54 (16.7%) species belongs to *Chenopodiaceae* family, the second place belongs *Asteraceae* family uniting 47 (14.6%) species and the third place belongs to *Brassicaceae* family presented by 42 (13.0%) species.

After the three leading families one can find two families *Poaceae* and *Fabaceae*, containing 37 (11.5%) species and 24 (7.4%) species, correspondingly. The listed families contain 204 species or 63.2% of the total number of the representatives of flora of the territories of the modern Syr Darya river valley broken as a result of the livestock pasture. The sixth position is occupied by *Cyperaceae* family uniting 9 (2.8%) species. The seventh position is occupied by *Boraginaceae* and *Caryophyllaceae* families, numbering by 8 (2.5%) species each one.

According to A.B. Baibulov (2009) mainly studying the vegetation of the modern valley and delta of the Syr Darya River using the GIS-technologies in 2002-2003, for this territory there were noted "282 species of the higher plants relating to 181 species and 52 families". At the same time the first seven positions, by the quantity of species, are held by 8 families composing 68.0% of their total number. Among them the most numerous was *Chenopodiaceae* family, 52 (18.4%) species. The second place is held by the representatives of *Asteraceae* family 47 (16.7%) and the third place belongs to *Poaceae* family, 34 (12.1%) species. *Fabaceae* family, 18 (6.4%) species, was located on the fourth place, and *Brassicaceae* family, 14 (4.9%) species, was located on the fifth place. Besides the families locating at the first seven places of the prevailing flora spectrum of the Syr Darya valley and delta the following families were located: *Polygonaceae*, 11 (3.9%) species and also *Ranunculaceae*, 7 (2.5%) species, and *Salicaceae* family, 7 (2.5%) species.

Monitoring of the condition of flora and vegetation of the wetlands (W) of the avandelta and the deltoid lakes of the modern Syr Darya valley (which entered the list of world wetlands) carried out in 2013 revealed 234 genera and 50 families (Monitoring of Ramsar grounds of the Syr Darya delta, 2014). These investigations were carried for identification of the territories which are suitable for preservation of the biodiversity of wetlands.

The seven of families was headed by *Chenopodiaceae* family presented by 52 (22.2%) species. The three of the leaders also contained *Asteraceae* family, 36 (15.4%) species and *Poaceae* family, 19 (8.1%) species. At the fourth place was *Fabaceae* family with 18 (7.7%) species, and the fifth place was occupied by *Brassicaceae* family with 17 (7.3%) species. The next position was formed by families whose quantitative structure is much less, than at previous ones. So, on the sixth line of the considered list *Cyperaceae* family with 9 (3.8%) species appeared; on the seventh line *Tamaricaceae* family with 5 (2.1%) species appeared.

As a result of inspection of laylands of the Kazaly rice massif 86 species belonging to 67 genera and 26 families were revealed (Vesselova, Kudabayeva, Muratova, Degtyareva, 2017). At the same time *Chenopodiaceae* family uniting 20 (23.3%) species is characterized by the greatest number of representatives. On the second place *Asteraceae* family including 15 (17.4%) of species appeared and on the third place *Poaceae* family with 12 (13.9%) species appeared. Then *Fabaceae* family and *Brassicaceae* family follow, presented by 10 (11.6%) and 6 (7%) species correspondingly. The sixth and seventh positions were taken by representatives of *Tamaricaceae* and *Cyperaceae* families, 3 (3.5%) and 2 (2.3%) species correspondingly.

According to data of table 1 in all there were found 12 families taking the first seven positions in a spectrum of taxons of a family rank of the compared floristic lists. At the same time in all provided lists the first five positions were taken by *Asteraceae*, *Chenopodiaceae*, *Poaceae*, *Fabaceae* and *Brassicaceae* families. And only in the floristic list of the region in general *Asteraceae* family was leading. In all other lists *Chenopodiaceae* family characterizing the specific feature of desert floras of the Kyzylorda region in general is on the first place. The families taking the third, fourth and fifth positions in each of

the discussed lists of species reflect, both specificity of an environment of the concrete territory, and an originality of its use by the human being. Besides, in structure of lists the volume (area) and orientation (geobotanical, floristic, ecological) problems of botanical researches are presented. For example, ranges of the leading families of floristic lists of the ancient and modern Syr Darya River valley in general and the territories of the modern valley of this river broken as a result of livestock pasture differ from the others by the third, fourth and fifth positions (see table 1). Brassicaceae family occupying in other compared lists the fourth or fifth lines takes the third place at these lists. It is connected with the anthropophilic nature of this family, which is expressed in a significant amount of wild species as a part of *Brassicaceae* family.

Table 1. Distribution of the leading families of the compared floristic lists on the first seven positions of a spectrum

Districts	A	B	C	D	E	F
Families						
Asteraceae	1	2	2	2	2	2
Chenopodiaceae	2	1	1	1	1	1
Poaceae	3	4	4	3	3	3
Brassicaceae	4	3	3	5	5	5
Fabaceae	5	5	5	4	4	4
Polygonaceae	6a			6a		
Cyperaceae	6b	7a	6b		6b	7a
Boraginaceae	7b	6c	7b			
Ranunculaceae				7c		
Salicaceae				7d		
Caryophyllaceae			7e			
Tamaricaceae					7f	6d
Total number of species	1096	401	323	282	234	86

Note: A – Kyzylorda region (State inventory of plants of Kyzylorda region, 2013); B – ancient and modern valleys of the Syr Darya River, including the territory between two rivers; C – the territories of the modern valley of the Syr Darya River broken by livestock pasture (Vesselova, Kudabayeva, Dimeyeva, 2016); D – modern floodplain and delta of the Syr Darya River (Baibulov, 2009); E – wetlands of an avandelta and deltoid lakes of the Syr Darya River (Monitoring of Ramsar grounds of the Syr Darya delta, 2014); F – laylands of the Kazaly rice massif of Kyzylorda region (Vesselova, Kudabayeva, Muratova, Degtyareva, 2017); from the 1st till 7th – the taken positions (places) in a family spectrum.

Following 7 families *Cyperaceae*, *Polygonaceae*, *Boraginaceae*, *Ranunculaceae*, *Salicaceae*, *Caryophyllaceae* and *Tamaricaceae* occupy the sixth or seventh lines by the number of their representatives in the analyzed lists. And, *Cyperaceae* family is a part of the leading taxons in 5 floristic lists (from 6 compared ones); *Boraginaceae* is a part of the leading taxons in three floristic lists, the *Polygonaceae* and *Tamaricaceae* families – in two floristic lists, and *Ranunculaceae*, *Salicaceae* and *Caryophyllaceae* families are presented among the first seven positions only in one list.

Insignificant structure of *Cyperaceae* family, 5 types, described by Baibulov (2009), does not allow it to hold a high position in a spectrum of the leading families of the floodplain and delta of the Syr Darya River. According to our opinion it is connected with the geobotanical direction of the investigations based mainly on dominant and co-dominant species of plant communities.

Absence *Polygonaceae* family in the list of the leading families of flora of Ramsar grounds of the Syr Darya delta (2014) and in the list of species structure of laylands' rice fields (2018) in the first case emphasizes the features of ecological conditions of the species growth near the delta of the river caused by physical-geographical characteristics of the region, and in the second case it also emphasizes the nature of anthropogenic influence on the landscape (rice cultivation), etc.

The comparative taxonomical analysis of various floristic lists of a desert part of the Syr Darya River valley (in a varying degree reflecting real composition and structures of the corresponding floras) demonstrated that their composition and structure are caused by the followings:

- the area of the territory captured by the investigations (as in respect of physical-geographical naturalness of the studied apportionment, and its sizes);
- variety and features of its environmental conditions and also features of use of this territory by a human being (managing methods);
- the direction of the investigations, in particular the nature of the purposes and tasks set for the researcher (the reasons are formed in process of decrease of the impact influencing the research results).

At the same time the composition of the first five leading families of the compared lists, reflects the general regularities of addition of Turan flora (within which the desert part of the Syr Darya River valley is located) regardless of the purposes and volumes of the investigations.

The obtained information is not exhaustive and further may be added.

References

- Baibulov, A.B. (2009). Assessment of the current state of vegetation of the valley and delta of the Syr Darya River with use of GIS-technologies. Thesis of Doctoral Dissertation. Almaty (in Russian).
- Botanical geography of Kazakhstan and Central Asia (within the desert area). (2003). Saint Petersburg (in Russian).
- Cherepanov, S.K. (1995). Vascular plants of Russia and the adjacent states (within the former USSR). Saint Petersburg (in Russian).
- Determinant of plants of Central Asia. (1968-1993). Tashkent. (in Russian).
- Field geobotany. (1959-1972). Moscow-Leningrad (in Russian).
- Flora of Kazakhstan. (1956-1966). Alma-Ata. (in Russian).
- Monitoring of Ramsar grounds of the Syr Darya delta. (2014). Almaty. (in Russian)
- Ogar, N.P. (1999). Vegetation of valleys of semi-arid and arid areas of continental Asia: Abstract of a thesis. Thesis of Doctoral Dissertation. Almaty. (in Russian).
- Ogar, N.P. (2003). Vegetation of valleys of the rivers (pp. 119-144). In: Rachkovskaya, E.I., Volkova, E.A., Khramtsov, V.N. (Ed.). Botanical geography of Kazakhstan and Central Asia (within the desert areas). Saint Petersburg. (in Russian).
- The illustrated determinant of plants of Kazakhstan. (1969, 1972). Alma-Ata. (in Russian).
- The state inventory of plants of Kyzylorda region. Abstract of higher vascular plants. (2013). Almaty. (in Russian)
- Vesselova, P.V., Kudabayeva, G.M., Dimeyeva, L.A. (2016). Influence of degree of disturbance of plant cover onto species composition of the Syr Darya River valley. In: *Problems of botany of Southern Siberia and Mongolia*. Barnaul: *Proceedings of the XV International Scientific-Practical Conference*, 451-457 (in Russian).
- Vesselova, P.V., Kudabayeva, G.M., Masslova, O.M. (2017). Factors of anthropogenic impact on territories of Kyzylorda region (valley of the Syr Darya River). In: *Studying, preservation and rational use of flora of Eurasia*. Almaty: International scientific conference, 573-577 (in Russian).
- Vesselova, P.V., Kudabayeva, G.M., Muratova, N.R., Degtyareva, O.V. (2017). Species composition of laylands of rice plots of Kyzylorda region (Southern Kazakhstan). In: *Problems of botany of Southern Siberia and Mongolia*. Barnaul: *Proceedings of the XVI International Scientific-Practical Conference*, 5-8 (in Russian).
- Vesselova, P.V., Kudabayeva, G.M., Nelina, N.V., Bilibayeva, B.K., Osmonali, B.B. (2017). *Anthropophily element of the flora of the desert of the valley of the river Syrdarya (Kyzylorda region)*. Almaty: *Proceedings of the Institute of botany and Phytointroduction*, 23 (7) (in Russian).

Citation:

Vesselova, P.M., Kudabayeva, G.M. (2018). Comparative analysis of floristic lists of the desert part of the Syr Darya valley. *Ukrainian Journal of Ecology*, 8(4), 427-432.



This work is licensed under a Creative Commons Attribution 4.0. License
