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Hydrophilic flora of local water bodies of the Samarkand region and ways of its formation

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Abstract

The ever-increasing demand for natural resources in the world, in particular for the flora, is the main factor in the reduction of biodiversity and its disappearance. One of the main indicators of aquatic organisms in water bodies is the species composition of higher plants and its condition. There is a need to determine the level of anthropogenic influence on plants in the composition of hydrophilic flora and to develop measures to combat it. On a global scale, special attention is paid to scientific research on the study of the natural flora of water bodies of certain territories, the assessment of influencing factors on the formation of flora and monitoring. Especially, in water bodies of densely populated areas, the composition of the hydrophilic flora decreases and its sharp change is associated with the simultaneous influence of natural and anthropogenic factors. On the territory of the Samarkand region, located in the middle reaches of the Zarafshan river basin, there are complex natural and artificial water systems, which are especially distinguished by the diversity of hydrophilic flora. In recent years, as a result of a sharp increase in anthropogenic influence on this territory, it becomes necessary to compile a modern list of the hydrophilic flora of water bodies of the Samarkand region, take an inventory, analyze the formation of flora in various types of water bodies and protect species of natural populations with a shrinking range [1, 2, 3]. In this regard, an inventory of the flora of higher aquatic plants in various types of water bodies of the Samarkand region, determination of the distribution area of rare, useful species in them and the development of protection measures is of great scientific and practical importance.

Keywords: hydrophilic plants, reservoirs of different types, formations, taxonomy, hydrophyte, helophyte, hygrophyte

Introduction

The hydrophilic flora of different types of water bodies of the Samarkand region was formed in its own way, based on the characteristics of each water body. At the same time, the region in which the reservoirs are located, the physicochemical and ground properties of water, the peculiarities of the flow of reservoirs and their occurrence are of particular importance. The hydrophilic flora of different types of water bodies in such local areas as the Samarkand region was studied by T. Taubaeva [4], N.V. Shadrina [5], A.P. Laktionov [6], Kh. K. Matjonov *et al.* [7], which took into account the above-mentioned characteristics of water bodies.

Significance of the Study

The study of the hydrophilic flora of the local territories of the Samarkand region is of great scientific and practical importance. The vegetation of each local flora was formed in its own way. In the composition of each local flora, there are different types of plants that are used in different spheres of human activities.

Materials and Methods

During scientific expeditions (2016-2020), during research, more than 350 samples of herbariums of higher aquatic and coastal plants were collected from various types of reservoirs of the Samarkand region, which are stored in the herbarium of the Samarkand State University.

On the planned route, permanent expeditions of the reservoirs of the Samarkand region were carried out according to the seasons of the year (Fig. 1). The collection of herbaria and monitoring from various types of water bodies were carried out according to the method of Katanskaya V.M. (1981) and classification of reservoirs according to Lisitsina L.I. and Papchenkov V.G. (2020).

When defining taxonomic units, the publications “Flora of the USSR” [8], “Flora of Uzbekistan” [9], “Keys to Plants of Central Asia” [10] were used. The current flowering plant system is based on APG IV [11].

Scientific names of genera and species are given according to the "Keys to Plants of Central Asia" and international indices - International Plants Names Index [12], The Plant List [13].

Results and Discussion

The hydrophilic flora of water bodies of the Samarkand region includes 72 plant species belonging to 4 divisions, 6 classes, 34 families and 51 genera (Table 1). According to these data, the main part of the hydrophilic flora is the department Magnoliophyta, in which the number of species of monocotyledonous plants occupies a dominant position, followed by dicotyledonous plants. In the flora, the divisions Polipodiophyta and Equisetophyta each have 1 taxon, which is 1.39% of the total number of plants. In the department Bryophyta, 7 species have been identified, which is 9.72% of the total amount of hydrophilic flora.

Table 1: The composition of the hydrophilic flora of the Samarkand region

№	Taxonomic groups	Class	Family	Genus	Species	%
1	Bryophyta	2	5	7	7	9,72
2	Equisetophyta	1	1	1	1	1,39
3	Polipodiophyta	1	1	1	1	1,39
4	Magnoliophyta including	2	27	42	63	87,5
Liliopsida			13	23	36	50,0
Magnoliopsida			14	19	27	37,5
Total		6	34	51	72	100

The reservoirs of the Samarkand region were studied and analyzed taking into account the region in which they are located, the characteristics of the reservoir, dividing them into groups such as rivers, canals, ditches and ditches; reservoirs, fish ponds; mountain streams and springs; temporary accumulation ponds, rice fields and fertile swamp soils. Floristic analysis of the identified groups of water Bodies shows that they differ significantly from each other in floristic composition, and their flora was formed independently of each other. The relative richness of the hydrophilic flora of rivers, canals and drainage ditches has been revealed. This is due to the fact that the water in them is almost constant, the content of mineral and organic substances is sufficient, as well as the lack of mechanical purification contributed to the formation of various flora and became a habitat for rare species. In the canals flowing through the territory of Karasuv, Siyob, Chashma, Bulungur, Karasuv (Payaryk district), Mirzarik, the mosses *Riccia fluitans* L., *Ricciocarpus natans* (L) Corda., *Fissidens grandifrons* (Brid.) Limpr., Hydrophytes *Potamogeton pectinatus* L., *P. crispus* L., *P. perfoliatus* L., *P. natans* L., *Zannichellia palustris* L., *Myriophyllum spicatum* L., helophytes *Acorus calamus* L., *Butomus umbellatus* L., *Nasturtium officinale* W.T. Aitson., *Sium sisarum* L., *Veronica anagallis-aquatica* L., *Rorippa palustris* (L.) Besser, *Bolboschoenus martimus* (L.) Palla, Hygrophytes: *Equisetum arvense* L., *Triglochin palustris* L., *Artraxon langsdorffi* Hochst., *Polypogon demissus* Steud., *Cynodon dactylon* Pers., *Poa trivialis* L., *Glyceria plicata* Fries. *Cyperus flavidus* Retz., *C. sanguinolentus* Vahl., *C. serotinus* Rottb., *C. difformis* L., *C. longus* L., *Ranunculus pachycaulon* (Nevski) Luferov., *V. anagalloidis* Guss., *Mentha longifoilia* (L.) L., *Stachys setifera* C.A.Mey., *Sagittaria trifolia* L. Drainage ditches are also home to many aquatic plants. Drainage ditches differ from canals and ditches in that some species are very widespread in them in relation to others. In the Taylyak, Samarkand and Pastdargom districts, the medicinal plant *Nasturtium officinale* W.T. Aitson. is widespread in drainage ditches, which completely covers the water surface. It was revealed that *Typha laxmannii* Lepech., *T. angustata* Bory & Chaub are abundant in the drainage ditches of the Ishtykhan, Dzhambay, Payaryk and Kattakurgan regions in relation to other species and *Phragmites australis* (Cav) Trin.

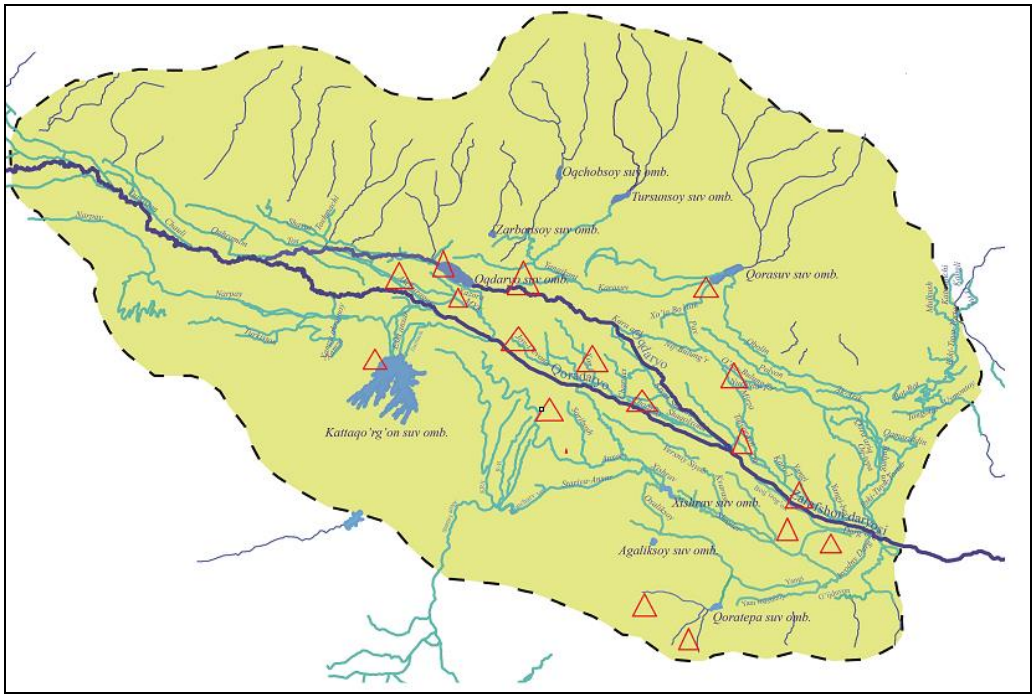

Fig 1: Schematic map of reservoirs of Samarkand region

The main reason for the rapid spread of some species is the discharge of wastewater, the systematic mechanical purification of water, as well as the collection by humans of the aboveground part of plants as animal feed and as building material, which leads to the rapid spread of species propagated by rhizomes and root suckers. The Kattakurgan, Akdarya and Karasuv reservoirs are characterized by a small number of species and their number. These reservoirs are adapted for the accumulation of excess water from rivers as a result of seasonal mudflows, so their water surface is not constant. In these reservoirs, the hydrophytes of *Zannichellia palustris* L., *Nayas marina* L., *Ceratophyllum demersum* L., *Potamogeton perfoliatus* L., *Myriophyllum spicatum* L are widespread; helophytes - *Phragmites australis* (Cav) Trin., *T. laxmannii* Lepech., *T. angustata* Bory & Chaub., *Cynodon dactylon* Pers., *Glyceria plicata* Fries., *Poa trivialis* L. *Nayas marina* L., *Ceratophyllum demersum* L., *Potamogeton perfoliatus* L., *Myriophyllum spicatum* L.

Fish ponds are mainly filled from rivers, streams, ditches and canals, as well as from groundwater. In this regard, *Typha laxmannii* Lepech., *Sparganium microcarpum* Celak., *Potamogeton pectinatus* L., *Nayas marina* L., *Triglochin palustris* L., *Sagittaria trifolia* L., *Alisma lanceolatum* L., *Cynodon dactylon* Pers., *Glyceria plicata* Fries., *Schoenoplectus lacustris* (L.) Palla., *Bolboschoenus*

martimus (L.) Palla., *Ceratophyllum demersum* L. -chemical composition and soil and climatic conditions, so it differs from the flora of plain reservoirs. *Heracleum lehmannianum* Bunge, *Orchis umbrosa* Kar. et Kir., *Datisca cannabina* L. are characteristic plants for mountain streams and springs.

In rice fields, in places where temporary irrigation is carried out, in lowlands after heavy rains and floods, water accumulates. Therefore, there is no permanent flora in these places. In rice fields, there is a sufficient amount of nutrients, the speed of water flow is low, therefore, the rapid growth and development of individual aquatic plants is ensured. Among these plants, *Echinochloa crus-galli* (L.) P. Beauv., *E. oryziocola* Vasing., *Cynodon dactylon* Pers. Are the most virulent weeds.

In addition to these plants, such plants as *Schoenoplectus lacustris* (L.) Palla., *Bolboschoenus martimus* (L.) Palla., *Rumex syriacus* Meisn., *R. conglomeratus* Murray., *Plantago major* L., *Typha angustata* Bory & Chaub., *T. laxmannii* Lepech., *T. minima* Funck., *Azolla caroliniana* Willd., *Sparganium microcarpum* Celak., *Lemna trisulca* L., *L. minor* L. water from trough irrigation ditches, in some places when water comes out of irrigation ditches, along the canals, large and small temporary reservoirs are formed.

As a result of excessive accumulation of moisture in the soil, a characteristic hydrophilic flora is formed in these places. Here, representatives of the hydrophilic flora are widespread: *Typha* L., *Persicaria* Mill., *Rumex* L., *Ranunculus* L., *Plantago* L. species, *Echinochloa crus-galli* (L.) P. Beauv., *Polypogon demissus* Steud., *Cynodon dactylon* Pers., *Cyperus longus* L., *Rumex syriacus* Meisn., *Rorippa silvestris* (L.) Besser., *Bidens tripartite* L., *Veronica anagalloidis* Guss., *Mentha longifoilia* (L.) L. that the water here is not constant.

In terms of the quantitative composition of the species of hydrophilic flora, common in the water bodies of the studied territory, the flora of the canals occupies a leading position, 31 species (43.05%) of plants are widespread here. The next places are occupied by drainage ditches of 25 types (34.72%), temporary reservoirs and moist soils of 22 types (30.55%), mountain rivers and springs of 21 types, (29.16%), fish ponds of 18 types, (25, 00%), rice fields of 12 types (16.66%), river banks of 10 types (13.88%) and reservoirs of 9 types (12.5%). Of the specific species, 10 (13.88%) are found in all types of water bodies as active species. These include *Typha angustata* Bory & Chaub., *Phragmites australis* (Cav) Trin., *Cyperus longus* L., *Schoenoplectus lacustris* (L.) Palla., *Cratoneuron filicinum* (Hedw.) Spruce., *Equisetum arvense* L.

Due to the fact that the territory of the Samarkand region belongs to dry climatic zones, sometimes there is a drying up of individual water bodies, as well as the formation of territorial hydrophilic flora, mainly due to adventive species, active species make up a small part of the total number of hydrophilic species. This is evidenced by the distribution of flora species in groups in relation to water.

A disproportionate formation of the ratio of the main taxa of the hydrophilic flora is observed. Flowering plants, which make up the bulk of the hydrophilic flora, include 24 families (70.59% of the total number of families), 42 genera (82.35% of the total number of genera), 63 species (87.5% of the total number of species). The main taxa of monocotyledonous plants occupy a clear leading position among the hydrophilic flora. One can see the mutual equality of the main taxonomic units Equisetophyta and Polipodiophyta.

In the hydrophilic flora of the leading families in terms of the number of species - 9, they include 42 species (58.33%). These leading families include 23 genera (45.09%). The rest of the families have 1-2 species and they make up 41.67%). Representatives of the monocotyledonous family (Poaceae, Cyperaceae) occupy a leading position in the studied area. They accounted for 16 species (22.22%). The next places are occupied by the next 7 leading families, which make up 36.11%. The remaining 3 families include (each with 2 species 2.77%) and 22 families with 1 species (each 1.38%).

Table 2: Taxonomic spectrum of hydrophilic flora in water bodies

Indicators	Water bodies			
	Rivers, canals, drainage ditches	Reservoirs, fish ponds	Mountai reservoirs	Temporary reservoirs other
Number of species	57/79,16%*	19/26,38%*	10/13,88%*	21/29,16%*
Number of genera	35/68,62%**	17/33,33%**	10/19,60%**	19/37,25**
Number of families	25/73,53***	17/50,00%***	9/26,47%***	17/50,00***
Average number of species per genus	1,62	1,11	1,0	1,10
Average number of species in a family	2,28	1,11	1,11	1,23
Average number of genus per family	1,40	1,0	1,11	1,11

Note: * in% of the total number of species, ** in% of the total number of genera, *** in% of the total number of families

Conclusion

As a result of the analysis of the ratio of taxa of hydrophilic flora in rivers, canals and drainage ditches in the study area, 57 species (79.16%) were identified belonging to 35 genera, 25 families, 19 species were found in reservoirs, fish-breeding ponds (26.38%) belonging to 17 genera, 17 families, in mountain rivers and around springs 10 species (13.88%), belonging to 10 genera, 9 families, in rice fields, temporary reservoirs, as well as highly moistened soils 21 species (29.65 %), belonging to 19 genera and 17 families. In water bodies, a difference was also observed in the mutual ratio of taxa (Table 2). Current water bodies such as rivers, canals, irrigation ditches and drainage ditches in the study area are characterized by a high occurrence of species, occupying relatively large territories and enriched by the addition of adventive species due to their direct connection with other territories.

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References

1. Tashpulatov YSh, Khamdamov IKh, Nurniyozov AA. “Water and Coastal Water Vegetation of Various Types

of Waters in the Samarkand Region", EurAsian Journal of BioSciences,2014:13:1413-1417.
2. Nurniyozov AA, Tashpulatov YSh. "Flora and its Analysis. Hydrophilic Plants of Different Types of Water Bodies of the Samarkand Region (Uzbekistan)", Bulletin of Science and Practice. T,2020:6(9):20-34. https://doi.org/10.33619/2414-2948/59.
3. Tashpulatov YSh, Nurniyozov AA, Ulashev DS. "Useful Wetland Plants of the Samarkand Region (Uzbekistan)", Bulletin of Modern Research,2019:2-7(29):75-77.
4. Taubaev T. "Flora and Vegetation of water bodies of Central Asia",2017:490:132.
5. Shadrina NV. "Comparative Analysis of Aquatic Cenofloras of the West Kazakhstan steppe province", Hydrobotany: Methodology, Methods: Materials of the School on Hydrobotany, 2003, 184-186.
6. Laktionov AP, Meshcheryakova NO, Pilipenko VN. "Flora of reservoirs and Water Courses of the Astrakhan Region", 2014, 314.
7. Matjonova KhK, Orel MM, Matzhanov TK. "Higher Aquatic Plants of Water Bodies of the Detovoy Zone of the Amu Darya River are the Food Resource of Herbivorous Fish", Bulletin Karakalpak branch Academy of Sciences of the Republic of Uzbekistan, 2018, 47-51.
8. Katanskaya VM. "Higher Aquatic Vegetation of the Continental Reservoirs of the USSR". - L. 198 p. 1981.
9. Lisitsyna LI, Papchenkov VG. "Flora of Reservoirs Russia, 2020, 236.
10. "Flora of the USSR". In 30 and so - M.-L .: AN SSSR, 1934-1960.
11. "Flora of Uzbekistan". In 6 volumes. Academy of Sciences of the UzSSR. 1941-1962.
12. "Keys to plants of Central Asia". I-X volumes, 1965-1993.
13. Shcherbakov A.V. "Classifications of Life Forms and Analysis of Information on Regional Floras of Water Bodies", Byul.MOIP. Dept. Biol, 1994, 16-24.
14. Shcherbakov AV, Mayorov SR. "Aquatic adventive plants of the Moscow region". Bulletin of the Udmurt University. Biology. earth sciences,2013:2:57-61.
15. Angiosperm Phylogeny Group. "An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV", Botanical Journal of the Linnean Society – London: Kew Garden Press. – T,2016:181:1-20.
16. International Plant Names Index [Electronic resource].– http://www.ipni.org
17. The Plant List [Electronic resource]. – http://www. theplantlist.org