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Monocotyledonous and urban adventive species distributed in the graveyard flora of Namangan city (Uzbekistan)

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Abstract: This article presents the results of a study aimed at studying the flora of cemeteries located in the territory of the city of Namangan in 2023-2024. The research was carried out on the “Khurmatkhan-aya” cemetery of the city of Namangan. The taxonomic composition of monocotyledonous plants in the region, consisting of 27 species from 5 families and 20 genus, was determined. In addition, a list of adventitious species distributed in the city flora was formed, and according to the results of the preliminary study, 20 species of alien plants were recorded.

Keywords: Fergana valley, urbanoflora, adventiv, monocotyledonous, flora.

Introduction: Urbanized areas in the world occupy only 5% of the total land area, and are home to about 3 billion people. This is due to the increasing scale of urbanization, which is leading to a great deal of attention being paid to the study of urban vegetation cover.

The study of urban flora is one of the priority areas of modern floristics and phytogeography, and its scientific importance is steadily increasing due to the intensification of anthropogenic pressure both in time and space. Urban plant cover communities are in different ways related to human influence and

therefore are different for each structural unit of the city (Umedov and Esanov, 2024). The distribution of types of habitats in cities is an important condition for nature conservation and urban planning (Gulomov et al., 2024).

Although research has recently been conducted on the urban flora of Andijan region, research is ongoing in the other two regions of the Fergana Valley. (Sidikjanov, 2024)

Today, it is urgent to implement the following measures in order to preserve the composition of urban urban flora. In particular;

– Compiling a list of the species composition of flora existing in cities;

– Continuous monitoring of plant species with the participation of local residents;

– Creating green infrastructure;

– Creating ecological corridors both within and around cities;

– Planning the proper management of forest and meadow vegetation to maintain the functionality of the habitat throughout the seasons.

Today, the city of Namangan (Uzbekistan) occupies a leading position in terms of demographic growth. In particular, the population is 2931.5 thousand people (2021), with an average population density of 266 people per 1 km² (Figure 1). Today, the largest natural areas preserved in the city of Namangan are the cemeteries within the city (Mangulik, Khurmatkhan-aya). Most of the existing hills and hills in the northern regions of the city have been completely developed for industrial zones, residential areas, logistics and other purposes. This leads to the introduction of alien (adventitious) species that are adapted to environmental conditions into the city flora (Gulomov, and Mutalibxonova, 2024).

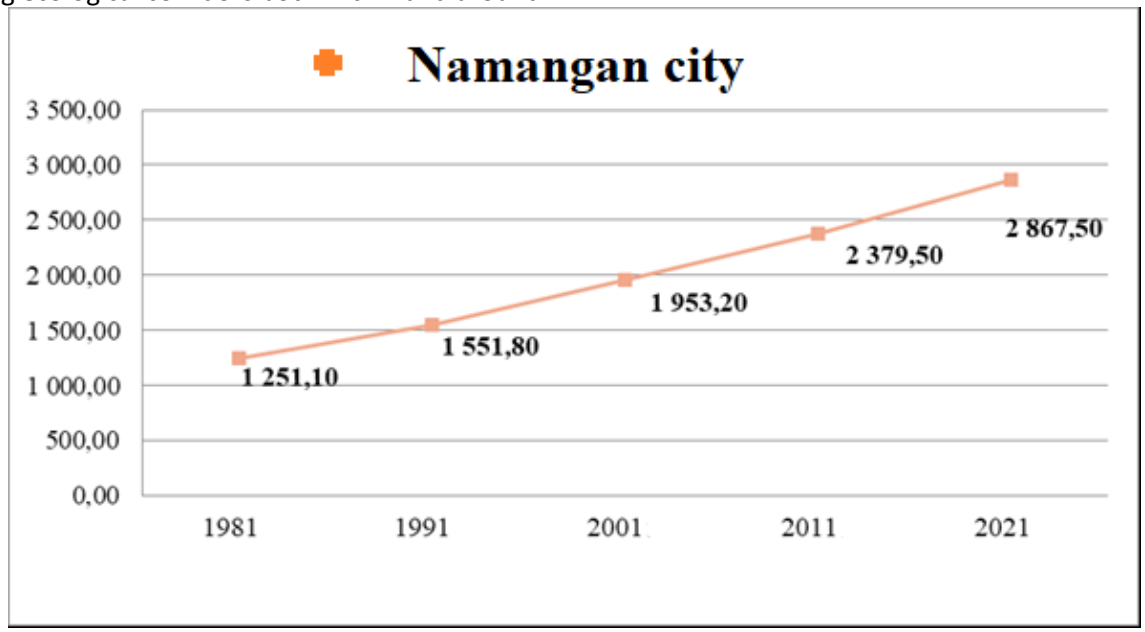

Figure 1. Demographic indicators in the Namangan region.

The purpose of the study is to 1) conduct a taxonomic analysis of monocotyledonous plants distributed in the "Khurmatkhan-aya" cemetery in Namangan; 2) compile a list of adventive monocotyledons distributed in the urban flora and provide suggestions and recommendations for the study of urban flora.

METHODS

In order to study the monocotyledonous plants of the urban flora of Namangan city, targeted field studies were conducted throughout the territory of Namangan city from March to August 2023–2024 (Figure 2). These field studies were carried out using the methods developed by A.V. Scherbakov, S.R. Mayorov (2006). The list of adventitious (alien) species identified in the

study area was checked from the list of international databases such as the Global Biodiversity Information Facility (GBIF) https://www.gbif.org/), Invasive Species Compendium (CABI) https://www.cabi.org/isc/) and formed on the basis of the existing list.

Figure 2. Study area

RESULTS

In Uzbekistan, special attention has been paid to cemeteries since ancient times. Often, hilly areas were chosen for cemeteries, surrounded by walls or fences. Mausoleums were built for famous people. Today, there are several large and small cemeteries in the city of Namangan, which were founded in different years. These include many natural areas such as Khurmatkhan-aya, Mangulik, Khanabad, and At-Bozor cemetery.

Field observations were conducted in the buffer zones of the “Khurmatkhan-aya” cemetery located in the “Gulobod” neighborhood of Namangan city in 2023-2024 (Figure 3). Today, the cemetery covers several hectares and in recent years, industrial zones have been encroaching on its buffer zones.

Figure 3. Satellite image of the Khurmatkhan-aya cemetery

Since cemeteries are areas that are somewhat isolated from direct human influence, a variety of flora and fauna can be found there. The soil of cemeteries is stony-gravelly, gray soils. The amount of precipitation varies, and the main cemeteries are located in mountainous, hilly and steppe areas or on hills within the city.

In addition, the flora is also considered unique. To date, the species composition of the flora of the cemeteries of Namangan city has not been studied. A list of endemic and rare species there has not been formed. This further increases interest in the flora of these areas. Cemeteries are fenced in various ways, animals are not allowed to roam and graze, plants are allowed to bloom normally and reproduce freely, tubers, bulbs or above-ground parts are not picked and collected. This prevents the disappearance of some rare species. According to the results of the observations carried out, many monocotyledonous plants were identified in this cemetery and they were registered. The following registered species are presented in Table 1.

Table 1. Taxonomic composition of monocotyledonous plants recorded at the "Khurmatkhan-aya" cemetery in Namangan city

№	Family	Genus	species	Life form
1	Poaceae	*Avena* L.	*Avena fatua* L.	Gemikriptofit
		Poa L.	*Poa bulbosa* L.	
			Poa angustifolia L.	
		Cynodon Rich.	*Cynodon dactylon* (L.) Pers.	

		Hordeum L.	*Hordeum murinum subsp. leporinum* (Link).	Gemikriptofit
		Lolium L.	*Lolium temulentum* L.	
			Lolium arundinaceum (Schreb.) Darbysh.	
		Eremopyrum (Ledeb.) Jaub. & Spach	*Eremopyrum orientale* (L.) Jaub. & Spach	Gemikriptofit
			Eremopyrum triticeum (Gaertn.) Nevski	
		Echinochloa P.Beauv.	*Echinochloa oryzoides* (Ard.) Fritsch	
			Echinochloa crus-galli (L.) Beauv	
		Eleusine Gaertn.	*Eleusine indica* (L.) Gaertn.	Terofit
		Phleum L.	*Phleum pratense* L.	
		Setaria P.Beauv.	*Setaria viridis* (L.) P.Beauv.	
		Bromus L.	*Bromus sewerzowii* Regel	
		Elymus L.	*Elymus repens* (L.) Gould	Gemikriptofit
2	*Cyperaceae* Juss.	*Carex* L.	*Carex leporina* L.	
			Carex pachystylis J.Gay	
		Cyperus L.	*Cyperus fuscus* L.	Terofit
			Cyperus difformis L.	
			Cyperus iria L.	
		Schoenoplectiella Lye	*Schoenoplectiella juncoides* (Roxb.) Lye	Gemikriptofit
		Fimbristylis Vahl	*Fimbristylis quinquangularis* (M.Vahl) Kunth	Terofit
		Schoenoplectus (Rchb.) Palla	*Schoenoplectus lacustris* (L.) Palla	Gemikriptofit
3	*Thymelaeaceae* Juss.	*Diarthron* Turcz.	*Diarthron vesiculosum* (Fisch.	Terofit

			& C.A.Mey).	
4	*Alismataceae* Vent.	*Alisma* L.	*Alisma plantago-aquatica* L.	Gemikriptofit
5	*Ixioliriaceae* Nakai	*Ixiolirion* Fisch. ex Herb.	*Ixiolirion tataricum* (Pall.) Herb. & Traub	
Total: 5 family		**Total: 27 genus**	**Total: 27 species**	

According to the results of the analysis, the identified species are relatively widespread in the urban flora of Namangan, have high reproductive potential, can produce many seeds, and are capable of rapid reproduction through various means.

Adventitious monocotyledonous plants distributed in the urban flora of Namangan were analyzed. According to the results of the analysis, 20 species of monocotyledonous plants distributed in the urban flora of Namangan were noted to be adventitious plants. These species are very widespread in the urban flora and are considered to be fast-growing alien plants that are resistant to adverse environmental factors. The list of identified adventitious species is given below.

1) Eriochloa villosa (Thunb.) Kunth. 2) Avena sterilis L. 3) Carex leporina L. 4) Cyperus difformis L. 5) Cyperus iria L. 6) Echinochloa oryzoides (Ard.) Fritsch, 7) Eleusine indica (L.) Gaertn., 8) Fimbristylis quinquangularis (M. Vahl) Kunth., 9) Hordeum jubatum L., 10) Lolium multiflorum Lam., 11) Lolium perenne L. 12) Lolium temulentum L., 13) Phalaris minor Retz., 14) Phleum pratense L., 15) Schoenoplectiella juncoides (Roxb.) Lye., 16) Schoenoplectiella roylei (Nees) Lye., 17) Setaria italica P. Beauv., 18) Setaria verticillata (L.) P. Beauv., 19) Sorghum halepense Pers., 20) Echinochloa crus-galli (L.) Beauv.

Today, the use of geographic information systems (GIS), remote sensing and DNA sequencing methods, data collection, analysis and monitoring are very important indicators in studying the composition of urban flora. In addition, a number of measures should be taken (Karimov, 2016). In particular, it is recommended to compile a list of the species composition of flora existing in cities, conduct constant monitoring of plant species with the participation of local residents, create green infrastructure, create ecological corridors both within and around cities, and most importantly, establish a Botanical Garden in the territory of Namangan city.

CONCLUSION

As a result of the research, the taxonomic composition of monocotyledonous plants in the buffer zone of the Khurmatkhan-aya cemetery in Namangan city was determined, consisting of 27 species from 5 families and 20 orders. In addition, a list of adventitious species distributed in the city flora was formed, and according to the results of the preliminary study, 20 species of alien plants were recorded.

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