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Phytocenological study of L. chinense Mill. and L. barbarum L. in the Tashkent Botanical Garden

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Abstract. In the context of increasing aridization of lands in Central Asia, caused by global climate change, it is necessary to actively select plants that are resistant to water deficiency. One such species is the Goji medicinal shrub (L. chinense Mill. and L. barbarum L.). Goji exhibits high adaptability to various climatic conditions, especially dry ones. Its ability to grow in low-moisture conditions makes it a valuable resource in regions with limited access to water. This research plays a key role in creating sustainable and efficient approaches to agriculture in the face of a changing climate and a deteriorating environment.
Key words: Goji, L. chinense Mill., L. barbarum L., dominant, subdominant.

Introduction. L. barbarum and L. chinense contain a wide range of nutrients, including polysaccharides, amino acids, flavonoids, carotenoids, vitamins and minerals. Their amazing properties include strengthening the immune system, suppressing the growth of cancer cells, improving vision and cognitive function, and lowering cholesterol and triglyceride levels in the blood. They also have the ability to help treat chronic hepatitis and liver cirrhosis. Goji berries are becoming increasingly popular in international markets due to their nutritional and antioxidant properties, making them one of the most sought-after superfoods.

The influence of biological invasions of plants, namely the appearance of alien species that negatively affect local ecosystems, is being actively studied in various regions. L. barbarum belongs to ergasiophytes (ERFs) - these are cultivated plants that can survive as part of the flora regardless of human intervention. Based on the time of their introduction into the region, they belong to neophytes (NF), which were introduced in the period from the 16th to the 19th centuries. In terms of the degree of adaptation to the environment, they belong to expansive species that actively spread in anthropogenic habitats. Lycium barbarum L. originally originates from China, and its invasive status is assessed as 2 - it is an alien species that successfully disperses and adapts to semi-natural and natural habitats. With climate change, it becomes possible to introduce promising heat-loving berry crops. As a result of the research of the collections, various genotypes were identified and the gene pool was replenished with new crops of L. barbarum, which opens up prospects for further study and use of these plants. [1,2].

Main part. The purpose of the study was to study cultivated herbaceous plants under a uniform water regime and using a single agricultural technology for cultivating Goji berry bushes in the conditions of the Tashkent Botanical Garden. Previous studies conducted by us have already covered the study of cultivated species of trees and shrubs including Goji under similar conditions [8,9,10,11,12,13].

Objects And Methods

The study used Rabotnov's methods in parallel with other methods, such as the O. Drude abundance scale and the estimate of projective cover. According to Rabotnov's method, the study area was divided into squares of a certain size. Plant cover in each quadrat was assessed, which was then classified by species, and plant cover in each quadrat was recorded and documented for subsequent analysis of species diversity and distribution in the study area of the Botanic Garden. The O. Drude abundance scale was also used to analyze and determine the dominant species affecting the distribution of plant communities [3,4,5,6].

Results And Discussion

From 2016 to 2024, an experiment was conducted in the Tashkent Botanical Garden to create a national landscape and flora on an area of 1.5 hectares. The species composition of perennial herbaceous plants is mainly represented by flora introduced from the mountainous regions of the Republic of Uzbekistan. This is

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reflected in Table 1. From the total number of collection samples, amounting to 177 species of the national landscape and flora, 50 species of herbaceous plants and 17 species of trees that are resistant to soil moisture deficiency have been identified to date. This is confirmed by our observations and allows us to conclude that these species are able to tolerate irregular watering without stress.

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а **б**

Figure - 1. Goji plantation in the Tashkent Botanical Garden
a - L. chinense b - L. barbarum

Table 1.

Herbaceous plants growing under conditions of irregular watering together with Goji berries

№	Natural regeneration status	Family	Genus	View	Number of samples			Abundance
					2019г	2020г	2021г	
1	Subdominant	Apiaceae	Daucus	carota L.	18	25	35	cop$_2$
2	Subdominant		Scaligeria	multiradiata Korov.	30	35	40	cop$_2$
3	Subdominant	Asteraceae	Cichorium	intybus L.	20	26	34	cop$_2$
4	There is no natural regeneration yet		Lactuca	spinidens Nevski.	15	15	15	sp$_2$
5	There is no natural regeneration yet		Carduus	Nutans L.	4	5	1	sol
6	There is no natural regeneration yet		Arcticum	leospermum Juz.et Cerg.	1	2	2	sol
7	There is no natural regeneration yet		Cartamnus	Lanathus L.	2	2	1	sol
8	There is no natural regeneration yet		Cartamnus	oxycantha Bieb.	1	1	3	sol

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№	Natural regeneration status	Family	Genus	View	Number of samples			Abundance
					2019г	2020г	2021г	
9	There is no natural regeneration yet		Achillea	fiependulina Lam.	1	1	1	sol
10	Subdominant		Artemisia	tianshanica Krasch.	28	25	32	cop$_1$
11	There is no natural regeneration yet		Artemisia	Vulgaris L.	1	2	3	sol
12	There is no natural regeneration yet		Artemisia	siversiana Willd.	6	1	2	sol
13	There is no natural regeneration yet		Artemisia	absinthum L.	4	20	4	sp$_1$
14	There is no natural regeneration yet		Artemisia	Sogdiana Bge.	4	1	1	sol
15	There is no natural regeneration yet		Artemisia	bulbosum Torn. Turanica Krascn.	1	6	4	sol
16	There is no natural regeneration yet		Echinops	maracandicus Bge.	5	19	32	cop$_1$
17	There is no natural regeneration yet	Lamiaceae	Melissa	officinalis L.	3	4	1	sol
18	Subdominant		Menta	asiatica Boriss.	28	20	48	cop$_1$
19	There is no natural regeneration yet		Menta	piperita L.	7	2	2	sol
20	There is no natural regeneration yet		Lallemantia	Royleana (Wall.) Bnth.	2	3	4	sol
21	Subdominant		Salvia	sclarea L.	7	48	50	cop$_2$
22	There is no natural regeneration yet		Salvia	deserta Schang.	9	7	1	sol
23	There is no natural regeneration yet		Leonurus	turkestanicus v. Krecz.	1	-	1	sol
24	There is no natural regeneration yet	Iridaceae	Iris	setosa L.	1	7	5	sol
25	There is no natural regeneration yet	Hyacinthaceae	Muscari	Bucharicum Regel.	7	1	3	sol
26	There is still little natural regeneration	Euphorbiaceae	Euphorbia	Helioscopia (L) Scop.	4	7	18	sp$_3$
27	There is no natural regeneration yet	Rosaceae	Potentilla	Suptina L.	2	1	3	sol
28	There is no natural regeneration yet		Potentilla	Kurdica Boiss.	5	19	30	cop$_2$
29	There is no natural regeneration yet		Agrimonia	eupatoria L.	1	4	1	sol
30	There is no natural regeneration yet		Sanguisorba	minor Scop.	15	2	10	sp$_2$

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№	Natural regeneration status	Family	Genus	View	Number of samples			Abundance
					2019г	2020г	2021г	
31	Dominant	Capparidaceae	Capparis	spinosima L.	10	29	100	cop3
32	There is still little natural regeneration	Umbelliferae	Carum	carvi L.	8	20	20	sp3
33	There is no natural regeneration yet		Foeniculum	Vulgare Mill.	1	2	3	sol
34	There is no natural regeneration yet	Amaryllidaceae	Allium	suworowii Regel.	3	3	5	sol
35	There is no natural regeneration yet		Allium	Schubertii Zucc.	1	4	1	sol
36	There is no natural regeneration yet		Allium	Paradoxum (Bieb) G. Donfil.	25		1	sol
37	There is no natural regeneration yet	Cyperaceae	Carex	melanostacha M.B.	35	30	35	sp3
38	There is no natural regeneration yet		Carex	stenophilloides V. krez.	-	1	1	sol
39	There is still little natural regeneration	Poaceae	Elitrigia	trichophora (Link) Nevski.	20	25	25	sp2
40	Dominant		Hordeum	bulbosum Torn.	3	38	90	cop3
41	Dominant		Hordeum	Spontaneum C. Koch.	2	145	200	cop3
42	There is still little natural regeneration		Poa	bulbosa L.	10	25	28	sp3
43	Subdominant		Avena	fatua L.	10	24	80	cop2
44	Dominant		Avena	sterilis L.	3	29	200	cop3
45	Subdominant		Aegilops	trincialis L.	5	120	125	cop2
46	There is still little natural regeneration		Phleum	Alpinum Link	13	5	20	sp3
47	Dominant		Taenatherum	crinitum (Schreb) Nevski.	11	128	500	cop3
48	Dominant		Lolium	temulentum L.	13	152	560	cop3
49	Subdominant		Dactylis	glomerata L.	1	13	80	cop2
50	Dominant		Cynodon	dactylon Pers.	120	125	300	cop3

Table 1 lists the species composition capable of cultivation on lands with irregular watering. The dominant ones are species from the family Poaceae: Hordeum spontaneum C. Koch., Hordeum bulbosum Torn., Cynodon dactylon Pers. These species play an important role as ground cover forage plants. Avena sterilis L., Taenatherum crinitum (Schreb) Nevski., Lolium temulentum L. from the family Poaceae were also

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identified as dominant species.Среди лекарственных растений, заслуживающих внимания, следует отметить каперс из семейства Capparidaceae – вид Capparis spinosima L.

Among the subdominants: from the Apiaceae family - Daucus carota L., Scaligeria multiradiata Korov.; from the family Asteraceae – Cichorium intybus L., Artemisia tianshanica Krasch., Echinops maracandicus Bge.; from the family Lamiaceae – Mentha asiatica Boriss., Salvia sclarea L.; from the family Rosaceae – Potentilla kurdica Boiss.; from the Poaceae family – Avena fatua L., Aegilops triuncialis L., Dactylis glomerata L. are of particular importance. The remaining 31 species are also recommended to be grown along with Goji berries, but with more frequent watering.

Conclusions:

1. From 2016 to 2024, research was carried out at the Tashkent Botanical Garden, the purpose of which was to identify significant aspects of the cultivation of cultivated and wild plants that can adapt to irregular watering. The results of these studies indicate a high potential for the cultivation of various species of herbaceous plants and dendroflora that can adapt to conditions of water deficiency.
2. Identifying plant species that can successfully adapt to irregular watering and have the ability to regenerate naturally is a key aspect of the study. Goji shrubs (Lycium chinense and L. barbarum) play an important role in the formation and maintenance of the national landscape and flora, as they successfully adapt to conditions of limited watering.
3. It has also been found that some plant species such as Hordeum spontaneum C.Koch, Hordeum bulbosum Torn., Cynodon dactylon (L) Pers, and caper (Capparis spinosima L.) have high value as fodder or medicinal crops and grow successfully with insufficient watering.
4. The findings of this study provide important input for the development of recommendations for the introduction of effective agricultural practices in conditions of limited access to water resources. This plays a key role in ensuring sustainable agricultural development and maintaining environmental balance.

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