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FORMATIONS OF SAXAUL (HALOXYULON) IN THE VEGETATION OF THE KARSHI DESERT

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Abstract
The article provided information of the results of a study conducted in the Karshi desert in 2021-2022. The study studied the formation of saxauls in the Karshi desert and their species composition. The results of the study were analyzed statistically and the current state of saxaul formations in the Karshi desert was assessed based on the results of the analysis. In addition, the impact of anthropogenic factors on desert flora was studied.

Keywords: Haloxyulon persicum, Haloxyulon aphyllum, Artemisia diffusa, Karshi desert, Anthropogenic factors.

Introduction

The existing desert area in the Republic of Uzbekistan occupies 15067.3 thousand hectares or 74.3% of the total area. 12685 thousand hectares of this area are located in Bukhara region, 8787.1 thousand hectares in Samarkand region and the remaining 1595.2 thousand hectares in Surkhandarya region. Most of the main areas of desert pastures are in the Kyzylkum and Karshi desert areas. [1]

The Karshi desert is located in the Kashkadarya, Bukhara, Samarkand and Navoi regions of Uzbekistan, as well as in the Turkmenabad region of the neighboring Republic of Turkmenistan. The total area is 13,000 km2. [1,2]

Field of saxauls are described in the literature as a type of psamophilic tree-shrub. In particular, the book "Natural conditions and resources of southwestern Uzbekistan" (1961) shows that the existing psamophilic plants in the Karshi desert form 8 different associations, which together combine to form 5 different formations and 2 types. Among them, special emphasis is placed on the formation of saxophones. [2,3]

Metodlar Methods:

In the study of existing plant communities based on generally accepted traditional geobotanical methods for the analysis of their species spectra; route and semi-stationary methods were used [3,4,5,6].

To determine the composition of the species, 4 areas were selected for the study **(pic-1)** and 36 counting points were identified in each selected area. Each counting point covers an area of 200 square meters. After counting the species composition was analyzed and evaluated according to the degree of surface coverage[3,5].

When the formations of the saxaul of the Karshi desert was studied on the basis of the ArcGIS program, it was found that it was distributed in the northern latitude and eastern longitude. The study included shrubs and semi-shrubs that identified the main formation. Ephemeral and ephemeroid species were not counted in our research.

Results

Our research has shown that in the Karshi desert, mainly white saxaul **(Haloxyulon persicum Bge)** is widespread.

Also black saxaul **(Haloxyulon aphyllum)** was observed in small communities or forming small associations in saline soils.

Haloxyulon persicum Bge is a desert tree up to 3-5 m tall, the leaves are very small, inconspicuous, up to 1.5 mm in size. This species has formed large communities with several plants in the sandy or loamy areas of the Karshi desert.

In the Haloxyulon persicum Bge associations, the rate of plant cover was noted to be 10-35%.

Our research was conducted in 4 selected regions. The first of these is **AREA №1.** the area located 39° 19ᴵ latitude north and 64° 50ᴵ east longitude, 258 m above sea level. Plants cover 25-28% of the surface. Species Halaxylon persicum Bge. 20-22%, Artemisia diffusa Krasch. 3-5%, Ferula foetida (Bunge) Regel10-12%, Carex physodes M.Bieb. 1% were found in the region (table-1). Also, In this area, species such as Ceratocephalus falcatus (L.) Pers., Arnebia decumbens (Vent.) Coss., Alyssum desertorum Starf., Iris linifolia, Taraxacum sp, Climacoptera lanata (Pall.) Botsch., Amberboa turanica Iljin., Astragalus campylorhynchus Fisch. & C.A.Mey., Index Seminum, Plomis sp, Iris songarica Schrenk, Erodium, Salsola richteri Katel, Haplophyllum bungei Trautv, Convolvulus hamadae Petr. can be found.

AREA №2 is located at latitude 39° 09ᴵ north and 64° 50ᴵ east longitude, with vegetation in this area covering 35% of the earth's surface. In the formations mainly Halaxylon persicum Bge 25-30%, Salsola arbuscula Pall. 20-25%, Ferula foetida (Bunge) Regel. 10-12%, Artemisia diffusa Krasch. 1-2% Ammothamnus lehmannii Bunge., 1% Carex physodes M.Bieb. 2% species occur **(table-2).** In addition, some ephemeral and ephemeroid species Phlomus sp, Ceratocephalus falcatus (L.) Pers., Strigosella sp., Allium cospicum, Iris songarica Schrenk, Tulipa

sagdiana, Erodium, Alyssum desertorum Starf, Holosteum umbellatum subsp, Goldbachia loevigata, Calligonum sp, Iris linifolia, Eminium lehmani, Ephedra strobilaceae Bge., Astragalus chiwensis, Gageo chomutovae (Pasch.) have been reported.

AREA №3 covers an area of 38° 57ᴵ latitudes north and 64° 50ᴵ east longitude 289 m above sea level. In the associations, the plants cover up to 18-20 percent of the surface. Plants are relatively rare in the above 2 areas. In the main associations consist of species such as Halaxylon persicum Bge. 8-12%, Salsola richteri Katel. 12-15% Ferula foetida (Bunge) Regel. 18-20%, Alhagi pseudalhagi (M. Bieb.) 5-8%, **(table-3).** In addition, we encountered species such as Astragalus villasissimus Bge., Chrozophora sp, , Phlomis sp, Atriplex sp, Poa bulbosa Litv, Hordeum leporinum Link, Acantholepis, Alyssum desertorum Starf., Holosteum umbellatum subsp, Ceratocephalus testiculata, Heliotropium arguzioides K. et K..

AREA №4 located 38° 45ᴵ latitude and 64° 50ᴵ east longitude 288 m above sea level. Associations of saxauls are widespread there. Since the surface part of these areas is composed of sand dunes, it has been observed that the plant community is sparsely distributed, the number of species is less than that of other associations. Plants cover 10-12 percent of the earth's surface. The main part of the associations consist of Halaxylon persicum Bge. 8-10%, Salsola richteri Karel 10-15%, Ferula foetida (Bunge) Regel, 8-10% Ammodendron conollyi Bge. 2-3%, Carex physodes M.Bieb 1% specieses **(table-4).** Also we were encountered some species such as Acanthophyllum Borszczovii Litv., Astragalus sp., Euphorbia turkestanica Regel, Astragalus chiwensis, Astragalus villosissimus Bge.

Discussion

In other associations of saxauls of Karshi desert, the species composition is close to the associations we have considered, often differing by one or two species.

According to our observations, a number of factors have been identified that have led to changes in vegetation cover in the Karshi desert saxauls.

The most important of these are the effects of anthropogenic factors, such as cutting down trees and shrubs for fuel, vigorous grazing during oil and gas exploration or mining, over-feeding of livestock, and dry mass harvesting for the winter.

The destruction of saxaul-like trees and shrubs in the Karshi desert is leading to the deterioration of the desert ecosystem. Given that desert conditions create a favorable environment for other plants in saxaul-growing areas, the decline of this species alone has limited the growth of many other plants, leading to a decline in the biodiversity of desert ecosystems.

Saxaul lives in the desert for 30-60 years, depending on environmental conditions, which determines the state and direction of the environment. It is also a high quality nutritious fodder for livestock in the fall and winter.

The increase in the number and regular grazing of livestock in the areas we study to date has led to the extinction of saxophones. This has led to a negative change in the ecosystem, with an increase in the number of poisonous species in some areas that have little nutritional value or are not consumed by livestock.

In addition, many oil and gas fields, heavy trucks, and portable equipment used for oil extraction are being towed from one place to another.

Conclusion

In conclusion to reducing the impact of anthropogenic factors on the conservation of desert plants, we believe that the grazing of livestock should also be organized according to a specific plan. Otherwise, the degradation of saxophones, which is typical for desert ecosystems, will intensify and many species of plants may become extinct.

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Table-1 Statistics of plant species in AREA №1

Statistic	Halaxylon persicum Bge	Salsola arbuscula Pall.	Ferula foetida (Bunge) Regel	Artemisia diffusa Krasch.	Carex physodes M.Bieb.
Nbr. of observations	36	36	36	36	36
Minimum	0.000	0.000	0.000	0.000	0.000
Maximum	8.000	10.000	5.000	5.000	3.000
Mean	2.250	3.250	2.222	1.750	0.917
Variance (n)	3.743	8.521	2.784	3.021	1.076
Standard deviation (n)	1.935	2.919	1.669	1.738	1.037
Variation coefficient (n)	0.860	0.898	0.751	0.993	1.132
Standard error of the mean	0.327	0.493	0.282	0.294	0.175
Standard error of the variance	0.920	2.095	0.685	0.743	0.265

Table-2 Statistics of plant species in AREA №2

Statistic	Halaxylon persicum Bge	Salsola arbuscula Pall.	Ferula foetida (Bunge) Regel	Artemisia diffusa Krasch.	Ammothamnus lehmannii Bunge.	Carex physodes M.Bieb.
Nbr. of observations	36	36	36	36	36	36
Minimum	0.000	0.000	0.000	0.000	0.000	0.000
Maximum	8.000	10.000	7.000	6.000	5.000	3.000
Mean	2.667	3.528	2.694	2.250	1.556	1.250
Variance (n)	5.889	11.194	4.768	3.743	2.080	1.188
Standard deviation (n)	2.427	3.346	2.184	1.935	1.442	1.090
Variation coefficient (n)	0.910	0.948	0.810	0.860	0.927	0.872
Standard error of the mean	0.410	0.566	0.369	0.327	0.244	0.184
Standard error of the variance	1.448	2.752	1.172	0.920	0.511	0.292

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Table-3 Statistics of plant species in AREA №3

Statistic	Halaxylon persicum Bge	Salsola arbuscula Pall	Ferula foetida (Bunge) Regel	Alhagi pseudalhagi (M. Bieb.)
Nbr. of observations	36	36	36	36
Minimum	0.000	0.000	0.000	0.000
Maximum	6.000	8.000	5.000	30.000
Mean	1.861	2.667	1.972	4.694
Variance (n)	3.342	6.389	2.860	66.546
Standard deviation (n)	1.828	2.528	1.691	8.158
Variation coefficient (n)	0.982	0.948	0.858	1.738
Standard error of the mean	0.309	0.427	0.286	1.379
Standard error of the variance	0.822	1.571	0.703	16.362

Table-4 Statistics of plant species in AREA №4

Statistic	Halaxylon persicum Bge	Salsola arbuscula Pall.	Ferula foetida (Bunge) Regel	Ammodendron conollyi Bge	Carex physodes M.Bieb.
Nbr. of observations	36	36	36	36	36
Minimum	0.000	0.000	0.000	0.000	0.000
Maximum	12.000	10.000	5.000	5.000	3.000
Mean	1.778	2.278	1.972	0.944	0.667
Variance (n)	6.617	7.923	2.860	2.775	0.833
Standard deviation (n)	2.572	2.815	1.691	1.666	0.913
Variation coefficient (n)	1.447	1.236	0.858	1.764	1.369
Standard error of the mean	0.435	0.476	0.286	0.282	0.154
Standard error of the variance	1.627	1.948	0.703	0.682	0.205