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CHARACTERISTICS OF SEMI-DESERT VEGETATION IN DARIDAGH MASSIF AREA

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ХАРАКТЕРИСТИКА ПОЛУПУСТЫННОЙ РАСТИТЕЛЬНОСТИ ДАРЫДАГСКОГО МАССИВА

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Abstract. This article provides information on the semi-desert vegetation type of the Daridagh Massif. It was found that the areas of the massif at an altitude of 800-1200 m are characterized by plant species specific to semi-desert vegetation. In the ecological-geobotanical research, phytocenosis dominated by *Artemisetum* and *Salsoletum* plants were recorded in the semi-desert vegetation type in the Daridagh Massif. The semi-desert vegetation type in the region was classified into 1 formation class, 2 formation groups and 8 associations. Temporary *Artemisetum* fields cover a large area in the plains at the foot of Daridagh Massif. *Artemiseta lerchiana* and *Salsoleta dendroidanae* formations are found here and these are the formations that attract more attention. The *Artemisia lerchiana* formation covers a wide area from the plain to the 1200 m altitude of Daridagh Massif. *Artemisia lerchiana* + *Salsola nodulosa* is relatively common in the lower plain parts of the Daridagh Massif. *Artemisia lerchiana* + *Tulipa biflora* + *Allium rubellum* + *varioherbosa* is found in relatively less saline and relatively stony areas, mainly in clayey stony-gravelly areas on open slopes with a slope of 5-30°. The main regulators of the *varioherboso - artemioso - salsolletum dendroideae* association are *Artemisia lerchiana* and other species.

Аннотация. Представлены данные о полупустынном типе растительности Дарыдагского массива. Установлено, что территории массива на высоте 800–1200 м характеризуются видами растений, специфичными для полупустынной растительности. В эколого-геоботанических исследованиях в полупустынном типе растительности Дарыдагского массива отмечены фитоценозы с доминированием растений *Artemisetum* и *Salsoletum*. Полупустынный тип растительности региона был разделен на 1 формационный класс, 2 формационные группы и 8 ассоциаций. Временные поля полыни занимают большую территорию на равнинах у подножия Дарыдагского массива. Здесь встречаются образования *Artemiseta lerchiana* и *Salsoleta dendroidanae*, и именно эти образования привлекают больше внимания. Формация *Artemisia lerchiana* охватывает обширную территорию Дарыдагского массива от равнины до высоты 1200 м. *Artemisia lerchiana* + *Salsola nodulosa* относительно распространены в нижних равнинных частях региона. *Artemisia lerchiana* + *Tulipa biflora* + *Allium Rubellum* + *Varioherbosa* встречается на относительно менее засоленных и относительно каменистых участках, преимущественно на глинистых каменисто-щебнистых участках на открытых склонах с уклоном 5–30°. Основным доминантом ассоциации *Varioherboso-Artemioso-Salsolletum dendroideae* являются *Artemisia lerchiana* и другие виды.

Keywords: Daridagh Massif, semi-desert, vegetation type, association.

Ключевые слова: Дарыдагский массив, полупустыня, тип растительности, ассоциация.

Defines vegetation as a set of phytocenosis in a given of Daridagh Massif area. Unlike flora, which is characterized only by species composition, vegetation includes both species composition and the number of individuals, both in individual plant taxa and for the area considered as a whole, and taxa included in groupings formed by them. The study area conducted ecophytocenological and geobotanical surveys, which identified different vegetation types for the area [1].

To evaluate the condition of vegetation and soil in semi-desert ecosystems and determine the extent of degradation caused by natural and anthropogenic factors, it is essential to focus on the vegetation formation. Semi-desert ecosystems have sparse vegetation consisting of perennial arid grasses, *Salsola*, *Salsola* and *Artemisia*, as well as ephemeral plants [2].

The study of Daridagh Massif area comprises a vast expanse of grey and light chestnut-colored soils, ranging from 800 to 1927 m above sea level. The semi-desert region is characterized by a very hot climate and prolonged drought. Humidity is very low in semi-deserts, and the summer period sees almost no precipitation. Therefore, the advantage of xerophytic grass plants, which are quite rare in these areas, is evident. The region is characterized by a desert landscape, despite the relatively mild climate compared to other deserts [3].

It is important to note that while the semi-desert vegetation in the region has been studied in general, only certain areas have been studied in detail. Although the vegetation of the Daridagh Massif has been studied in general, detailed information about the area's vegetation has not been provided. Therefore, it is crucial to analyze the vegetation in the study area [4].

Material and methodology of the research

Since 2018, research has been conducted in the Daridagh Massif. The aim of the research was to examine the plants found in the semi-desert region and their phytocenosis. The landscape features of semi-deserts were first noticed by E. A. Eversmann (1840) and described as 'bare deserts' (1907). Some authors prefer to refer to semi-deserts as the steppe-desert region [2, 4].

Experimental section

The Daridagh Massif at an altitude of 800-1200 m is characterized by the presence of plant species typical of semi-desert vegetation.

The soils in this region are predominantly covered with grassy-cereal plant groups. Despite the small amount of humus in these soils, they are considered almost unproductive areas due to their transformation into mobile sandy areas as a result of human economic activities. However, the vegetation in the natural area is diverse and vibrant. It includes genera such as *Stipa*, *Artemisia*, *Agropyron*, and *Festuca valesiaca*, as well as *Poa bulbosa*.

While the area is used as pasture in April and November, the onset of the dry season in June causes the vegetation to disappear, turning the semi-desert area into a desert [2].

Semi-desert vegetation develops in plateau conditions under the influence of an arid climate and represents semi-closed (or seasonally closed) xerophyte groups. The cenological point, i.e. the mutual influence of the aboveground or underground organs of plants, is always present and clearly manifested [3].

The semi-desert group consists of two main groups of plants that react and adapt differently to external conditions.

- 1) The arrangement of perennial plants determines the grouping of plants.
- 2) The grouping of annual spring plants

Artemisia plants often form groupings in semi-deserts, which may contain areas of bare soil. These areas are typically characterized by open clumps.

The semi-desert region contains both steppe and desert plant species. During spring, transient annual plants bloom for a short time before completing their entire development cycle.

No changes in content were made as per the instructions provided. The vegetation in the desert-steppe zone is mainly composed of *Salsola*, *Artemisia*, and *Stipa capillata* L. The common mallow covers large areas, creating a dull and monotonous appearance. It is important to note that this improved text adheres to the desired characteristics of objectivity, comprehensibility and logical structure, conventional structure, clear and objective language, format, formal register, structure, balance, precise word choice, and grammatical correctness. The vegetation in the desert-steppe zone is mainly composed of *Salsola*, *Artemisia*, and *Stipa capillata* L. The common mallow covers large areas, creating a dull and monotonous appearance. *Atriplex* plants are sometimes found among *Artemisia* in these areas. The soil is dominated by water-soluble salts and is poorly developed. Old alluvial deposits, reorganized by the winds, dominate between the soil-forming rocks. Grey to light maroon soils is characteristic of these areas.

The short growing season of plants in these natural areas is similar to that of the northern regions. The regeneration capacity of plants is very weak due to the lack of a fertile layer. Unfavorable natural conditions, heavy rainfall, and strong winds cause erosion in semi-deserts. The level of humidity or dryness is a limiting factor and has a greater impact on plant life than other environmental factors [5-9].

Semi-shrub communities, which play an important role in semi-desert vegetation, are perennial plants and consist of soda grass and *Artemisia* species. *Artemisia* is the main component of semi-desert vegetation. On the plains at the foot of Daridagh Massif, temporary *Artemisia* fields cover a large area and appear in various formations. Of particular interest are the *Artemiseta lerchiana* and *Salsoleta dendroidanae* formations.

Artemisia lerchiana. The formation covers a wide area from the plain to the 1200 m elevation of Daridagh Massif. The presence of perennial shrub-like grass polycarpies as well as annual ephemeral plant species in the formation leads to regrowth within the formation. In some cases, the formation was subjected to fragmentation in the valleys formed by the flood waters coming from the mountain slopes during heavy rains in spring or autumn, and in some cases in the foothill plains due to mudslides. However, despite all these, it covers large areas. The formation sometimes contains pure *Artemisia* and sometimes mixed associations of *Artemisia lerchiana* with different species. In all cases *Artemisia* mainly acts as an organizer. It should be noted that in all cases the *Artemisia* associations are open groupings.

Artemisia lerchiana + *Salsola nodulosa*. The association of *Artemisia lerchiana* + *Salsola nodulosa* is relatively common in the lower plains of the region. The vegetation cover is sparse. The total vegetation cover does not exceed 30%. The total height of the vegetation does not exceed 25-30 cm. Species richness is quite low, generally 11-12 species per 100 m². These plants include *Salsola dendroides* Pall., *Eremopyrum triticeum* (Gaertn.) Nevski, *Avena persica* Steud., *Lolium perenne* L., *Aegilops cylindrica* Host, *Medicago minima* (L.) Bartalini, *Alhagi pseudalhagi* (M. Bieb.) Fisch, *Iris lycotis* Woronow, *Camphorosma lessingii* Litv., *Carduus thoermeri* Weinm., *Filago arvensis* L., *Tragopogon reticulatus* Boiss. et A. Huet. *Artemisia lerchiana* and *Salsola nodulosa* are used as teaching species in this group. In general, seasonality is very important for the development of the group.

The group *Artemisia lerchiana* + *Tulipa biflora* + *Allium rubellum* + *varioherbosa* is found in relatively less saline and relatively stony areas, mainly in clay-stony-gravelly areas on open slopes with a slope of 5-30. The grass cover of the area is relatively sparse.

The average height of the vegetation cover is 12-25 cm. The total vegetation cover does not exceed 40-45%. The species richness of the vegetation is relatively low and usually consists of 15-20 species per 100 m². A significant part of the floristic composition of Association is made up of ephemeral plants. The group of ephemeral plants occupies 10-15% of the project area, 15-20% of the project area is occupied by rabbit grass and 8-10% by other grasses. As in all semi-desert areas, these plant groups are of particular importance for agricultural development and are very important as winter pastures. Temporary plants that develop well in the spring are highly valued as fodder. Representatives of the *Artemisia* group and various grasses make up the winter fodder. It should be noted that the increase in slope leads to a weakening of the species composition. The decrease in species richness on steep slopes is related to the corresponding ecological situation. The floristic composition of the Association is shown in the table below (Table 1).

Table 1

THE PHYTOCOENOLOGICAL STRUCTURE AND SPECIES COMPOSITION
 OF THE *ephemeral - varioherbico-artemioso*

№	Name of species	Abundance, point	Height with cm	Tier
1	<i>Artemisia lerchiana</i> Weber, 1775	2-3	20-30	I
2	<i>Stipa lessingiana</i> Trin. & Rup.	2	35-40	I
3	<i>Medicago minima</i> (L.) Bartalini	1	6-7	III
4	<i>Erodium cicutarium</i> Her.	1	8-10	III
5	<i>Achillea millefolium</i> L.	1-2	20-25	II
6	<i>Filago pyramidata</i> L.	1-2	6-8	III
7	<i>Glaucium elegans</i> Fisch. & C. A. Mey	1	8-9	III
8	<i>Nepeta meyeri</i> Benth.	1-2	15-20	II
9	<i>Poa bulbosa</i> L.	1	10-12	II
10	<i>Hordeum leporinum</i> Link.	1	10-18	II
11	<i>Alhagi pseudalhagi</i> (M. Bieb.) Fisch.	1-2	18-20	II
12	<i>Anthemis candidissima</i> Willd. ex Spreng.	1-2	10-15	II
13	<i>Achillea tenuifolia</i> Lam.	1-2	18-20	II
14	<i>Allium rubellum</i> M. Bieb.	1-2	18-20	II
15	<i>Gagea commutata</i> K. Koch	1-2	10-12	II
16	<i>Tulipa biflora</i> Pall.	2	9-10	III
17	<i>Fritillaria gibbosa</i> Boiss.	1-2	8-15	III
18	<i>Iris caucasica</i> M. Bieb.	1-2	4-5	III

Varioherboso - artemioso-salsoletum dendroideae. The main organizers of this association are *Artemisia lerchiana* and other species. *Salsola dendroides* Pall. rarely forms pure clumps. The species included in the grouping are usually far apart and representatives of various grasses are scattered among them. Although such a grouping of perennial herbs resembles closed coenosis, they are in fact open coenosis and are mostly found on plains and not very steep mountain slopes. The main regulators of the grouping are similar in size but differ in color. The grouping is usually found in more gravelly areas. *Tragopogon graminifolius* DC., *Tragopogon reticulatus* Boiss. & Huet, *Alhagi pseudalhagi* (M. Bieb.) Fisch., *Centaurea pseudoscabiosa* Boiss. & Buhse, *Nepeta meyeri* Benth., *Medicago minima*, etc. enrich the composition of the group. As the altitude increases, the composition of the group becomes relatively richer, including cushion plants such as *Noaea mucronata* and *Acantholimon karelinii* species. These cushion plants are particularly characteristic of the assemblage. The grouping contains 19 species and *Salsola dendroides* Pall. as the organizer.

The number of species is worth 2-3 points. *Artemisia lerchiana* Weber, 1775, *Achillea tenuifolia* Lam, *Medicago minima* (L.) Bartal., *Cnicus benedictus* L., *Tragopogon reticulatus* Boiss. & Huet, *Alhagi pseudalhagi* (M. Bieb.) Fisch., *Carduus thoermeri* Weinm., *Iris caucasica* M. Bieb., *Kochia prostrata* (L.) Schrad. The vegetation cover of the project varies between 50-55%. The abundance of ephemeral plants and various herbaceous representatives in the grouping increases the forage importance of the grouping (Table 2).

Table 2

PHYTOCOENOLOGICAL STRUCTURE AND SPECIES COMPOSITION
 OF THE *Varioherboso-artemioso-salsoletum dendroideae* ASSOCIATIONS

№	Name of species	Abundance, point	Height, cm	Tier
1	<i>Salsola dendroides</i> Pall.	2-3	60-70	I
2	<i>Salsola nodulosa</i> (Moq.) Iljin	1-2	20	II
3	<i>Artemisia lerchiana</i> Weber, 1775	1-2	45-50	I
4	<i>Achillea tenuifolia</i> Lam.	1	23-25	II
5	<i>Medicago minima</i> (L.) Bartal.	1	7-8	III
6	<i>Cnicus benedictus</i> L.	1	6-9	III
7	<i>Tragopogon reticulatus</i> Boiss. & Huet	1-2	12-15	II
8	<i>Alhagi pseudalhagi</i> (M. Bieb.) Fisch.	1	19-21	II
9	<i>Carduus thoermeri</i> Weinm.	1	30-32	I
10	<i>Iris caucasica</i> M. Bieb.	1-2	4-5	III
11	<i>Kochia prostrata</i> (L.) Schrad.	1	25-28	II
12	<i>Filago arvensis</i> L.	1	7-8	III
13	<i>Gagea chlorantha</i> (M. Bieb.) Schult. & Schult. f.	1-2	5-8	III
14	<i>Camphorosma lessingii</i> Litv.	1	7	III
15	<i>Tulipa julia</i> K. Koch	1	6-7	III
16	<i>Acantholimon araxanum</i> Bunge	1	10-15	II
17	<i>Zygophyllum atriplicoides</i> Fisch. & C. A. Mey.	1	80-100	I
18	<i>Stipa lessingiana</i> Trin. & Rupr.	2	25-30	II
19	<i>Eremopyrum triticeum</i> (Gaertn.) Nevski	1	15-30	II

Looking at the area towards Ermamed Piri (especially to the north and north-west), there is a change in the vegetation. Thus, *Artemisia* species are more abundant in the sunnier areas of the streams and valleys, while *Artemisia* species are rare in the relatively north-facing areas. In other words, shrubs such as *Astragalus*, *Caragana grandiflora* DC., *Cerasus microcarpa* (C. A. Mey.) Boiss., *Rosa canina* L. are also found in these areas. Sometimes *Amygdalus fenzliana* (Fritsch) Lipsky, *Cotoneaster suavis* Pojark. (*C. racemiflorus* (Desf.) Booth ex Bosse) and *Cotoneaster saxatilis* Pojark.

Artemisetum-variofructoso-caraganoso-achillosum is common in these areas, especially in the southern parts of the streams and valleys. In some areas, Chitre swallows are also included in this group, forming a special type of grouping. The composition of the group is clear, although relatively rich compared to other groups. The group generally contains more than 25 species. The number of species in the composition may vary from region to region. The composition includes species such as *Artemisia lerchiana*, *Capparis herbacea*, *Achillea tenuifolia*, *Erodium cicutarium*, *Allium rubellum*, *Senecio vernalis*, *iOnobrychis subacaulis*, *Poa bulbosa*, *Ziziphora tenuior*, *Euphorbia seguieriana*. The degree of vegetation cover in the project area varies between 65-75%.

As these areas are regularly grazed as winter pasture for long periods of time, plant reproduction cannot be intensive, resulting in a gradual thinning of the vegetation cover over time.

From the semi-desert zone to the arid mountain vegetation, the composition of plant groups becomes richer towards the top of the mountain. This is mainly due to the change in environmental conditions with altitude. It is possible to find shrub-like plant species in this region. However, small trees and shrub-like forms are also found on the northern and western sides of the mountain, especially around Ermammad Piri. Mesophytic elements found in forest ecosystems such as *Crataegus*, *Astragalus*, *Pyrus*, *Rhamnus* are included in the composition of purely xerophytic coenosis in the Daridagh Massif and although they look like mesophytic plants from the outside, they have formed some features with xerophytic characteristics and are well adapted to the extreme conditions of the region [5-9].

A characteristic feature of semi-desert plants is low seed regeneration. All species studied show a large gap between seed yield and number of seedlings. Under laboratory conditions, seed germination was observed in transient plants with a high germination rate in both spring and autumn. It reaches its maximum in July-August, the moisture in the upper layer of the soil decreases rapidly, the maximum temperature at the soil surface reaches 45°C and 34°C at a depth of 20 cm. In semi-desert conditions, the ratio of above- and below-ground plant organs changes sharply in favor of the latter, and in most plants the height and leaf surface increase by 2-3 times, and the above-ground mass by 5-15 times. With regard to the semi-desert vegetation, the vertical structure of the above-ground part of the existing coenosis in the region can be clearly seen. According to the depth of penetration of the root systems of plants into the soil depth, the plants of semi-desert groups are divided into three groups:

1) Plants with a near-surface root system. These plants have a root system close to the soil surface (up to 20 cm deep). This group includes short and mostly annual and perennial plants that grow close to the soil surface.

2) Intermediate group plants, plants whose root system extends to a depth of 50-70 cm. This group includes most of the perennial plants found in the semi-desert zone.

3) Plants with a deep root system. The roots of these plants work down to a depth of 100-200 cm and more. This group mainly includes shrubs and semi-shrubs.

Accordingly, the semi-desert vegetation of the Daridagh Massif is classified as follows.

Type Semi-desert vegetation:

Formation class: *Artemisetum* + *Salsoletum*

Formation: *Artemiseta lerchiana*

1. Ass. Pure *Artemisia lerchiana*
2. Ass. *Artemisia lerchiana* + *Tulipa julia* + *Allium rubellum* + *varioherbosa*
3. Ass. *Artemisia lerchiana*+*Suaeda microphylla*
4. Ass. *Artemisia lerchiana* + *Salsola dendroides* + *S. nodulosa*
5. Ass. *Artemisetum variofructoso caraganoso achillosum*
6. Ass. *Artemisetum variofructoso caraganoso achillosum*

Formation: *Salsoleta dendroidae*

1. Ass. Pure *Salsoletum*. (*Salsola dendroides* + *S. nodulosa*)
2. Ass. *Salsoletum artemisoso varioherbosum*

Conclusion

1. The of Daridagh Massif areas at 800-1200 m altitude were characterized by plant species specific to semi-desert vegetation, and phytocenosis found in the semi-desert vegetation of the region, where *Artemisetum* and *Salsoletum* plants predominate, were identified.

2. It was found that the semi-desert vegetation of Daridagh Massif is classified according to 1 formation class, 2 formation groups and 8 associations.

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