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PHYTOSOCIOLOGICAL FEATURES OF FRIGANA VEGETATION OF NAKHCHIVAN, AZERBAIJAN

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Abstract

The phytosociological and floristic properties of mountain xerophyte plant associations (Frigana) spread on the territory of Nakhchivan Autonomous Republic of Azerbaijan were investigated. These unions are dominated by barbed and grassy plants. On the other hand *Acantholimon* spp., *Astragalus* spp. and *Onobrychis cornuta* are common in the area and dominant in the mountainous regions of Nakhchivan. The major parts of Shahbuz, Julfa and Ordubad are dominanted by vegetation. In the floristic composition of the frigana units the shrubs are dominant and the characteristic species are: *Pyrus oxyprion, Astragalus microcephalus, Astragalus aureus, Juniperus polycarpos, Rhamnus pallasii, Atraphaxis spinosa, Acantholimon bracteatum, Rhus coriaria, Acer ibericum, Lonicera iberica, Prangos ferulacea, Thymus kotschyanus* etc. The frigana units dominate the region's vegetation. The mountainous xerophyte vegetation encompasses strongly torn by relief, rocky slopes, and talus of the territory of the mountains. The continentalization of the climate after the glacial era, as well as the advent of anthropogenic activity, appears to be effective in expanding the range of vegetation. Although skeleton is the only plant bitumen in the rocky slopes, it is important to protect the dive lining of the slopes along the slopes and to prevent the wash away and spoilage residues.

Introduction

The frigana vegetation is not only distributed in Minor Caucasus, but also in other mountainous regions of Azerbaijan such as Talysh, Bozdag, Great Caucasus and Nakhchivan. According to Talibov and Ibragimov (2008), there are 2935 vascular plant taxa in the flora of Nakhchivan. Grossheim (1948), Prilipko (1939), Ganbarli (1973) and Arustamova (1973) have studied the frigana vegetation of Minor Caucasus.

Some researchers (Grossheim 1925, Takhtajan 1937, 1946) claim that mountain xerophytes originated at the end of Neogene. Recent research, however, suggests that this vegetation emerged on the foothills of Iran and the small Asians and was linked to the Mediterranean Xerophile Center. Today, the frigana vegetation of the Nakhchivan region is a microproject, proving this by endemic species.

One of the factors influencing the development of mountain xerophyte vegetation in the Caucasian region is the process of mountain formation in the region. An important factor in this context is the continentalization of the climate that has started in the Miocene and continues in the fourth period. In the fourth decade, the formation of mountain xerophyte vegetation has been effective in the glaciation. Bush and Bush (1926) argued that xerophyte vegetation was a relict in Caucasus, and Arustamova (1973) argued that vegetation had progressive development. Prilipko (1939) noted that there are 16 units of frigana vegetation in Nakhchivan.

The frigana pillow shapes formed by the *Acantholimon hohenackeri*, *Astragalus aureus*, *A. microcephalus*, *A. picnophyllus*, *A. strictifolius* taxa in the high mountainous regions of Tuval

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in the Luvin Province borders of Zuvand and the Lesser Caucasus in 1800 - 2200 m although are rarely found among the vegetation, the *Onobrychis cornuta* has shown that species are spreading (Hajiyev, 1970; Hajiev, et al., (1979, 1990)).

Arustamova (1973) noted that Nakhchivan has 250 species of Frigana flora, 192 in Armenia, and 30 taxa in Kopet-Dag.

Materials and Methods

The materials belonging to the frigana vegetation were collected from the region between 2008 and 2015 and were used in the present study. The research area is a high mountainous topographic region with a terrestrial climate. The collected samples are stored in the Herbarium of Institute of Botany, Azerbaijan National Academy of Sciences. In the detection of the plants (flora studies) Flora of Azerbaijan (1954) and Cherepanov (1995) were used. To date, the phyto-sociological characteristics of Azerbaijan vegetation have been evaluated according to the principle of dominance, however the Braun-Blanquet approach (Braun-Blanquet 1964) was used in the current study. The classification of the Frigana vegetation in this study were performed according to the traditional Braun-Blanquet approach and evaluated. The classification was determined by using the studies of Barkman *et al.* (1964). New associations were named in accordance to "International Code of Phytosociological Nomenclature". Epithet types of associations and author names have been checked from The International Plant Names Index (2018).

Results and Discussion

Currently synthetic study of ecobiomorph is considered as one of the modern and important geobotanic research works for basic knowledge of structure of plant communities. Identification of composition of ecobiomorphs and ascertaining of their role in the formation of phytocenosis allow studying the history and regularities of formation, structure and dynamic of plant community and their attitudes to the environment. Ecobiomorphs are adaptive systems formed and exist in a certain situation. Ecobiomorphs intrinsic to any territory can serve as indicators of its natural

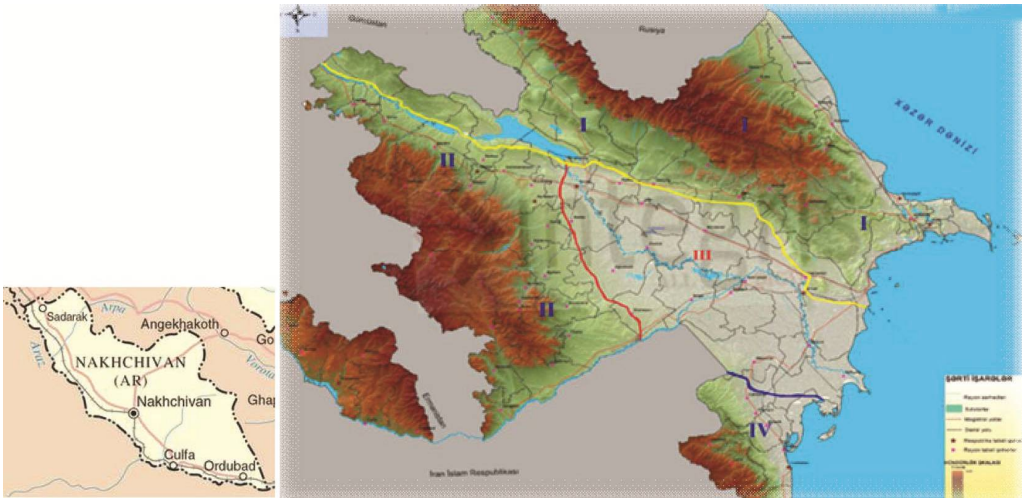
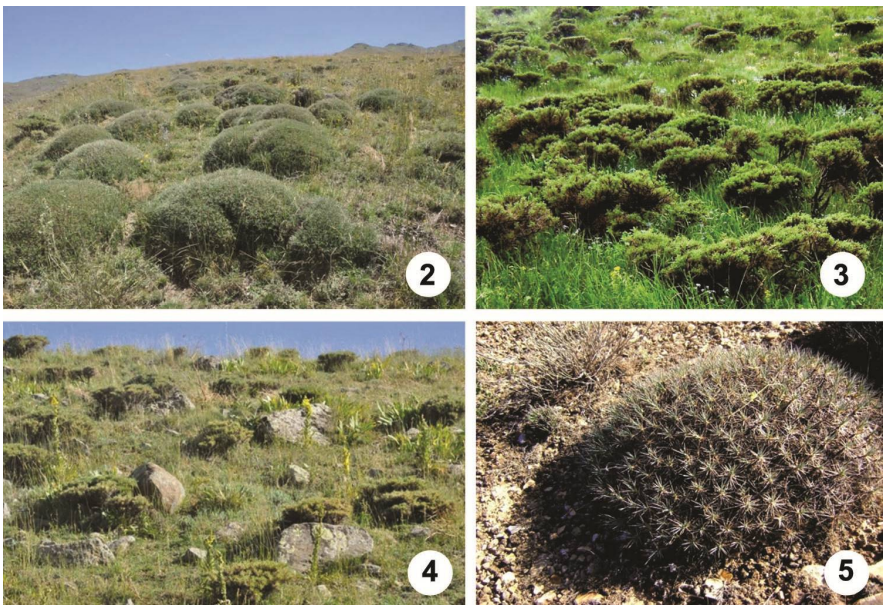


Fig. 1. Map of research area.

conditions. High continentally climate, severe winters, dry and hot summer, severely broken relief, prevalence of primitive and strongly hard soils, rocks and screes on the slopes subjected to erosive processes exert a strong influence on the formation of vegetation (Ibragimov 2005).

The most common type is mountainous - xerophyte vegetation, which has zonal value represented by a variety of diverse plant groups relevant to arid soil and climatic conditions. Difference in the composition of groups of upland xerophytes conditioned by petrographic composition of rocks, in various degrees prone to weathering processes, by differences of primitive soils, exposition of slopes and height above sea level. Upland-xerophyte vegetation most pronounced in the mid-altitude mountain belt (1200 - 2600 m). Higher in the band from 1500 to 1900 metres mountainous - xerophyte vegetation combined with the prevailing, mountain-steppe, as well as with meadow-shrub and forest in the central part of the republic. The modern flora of Nakhchivan AR is represented by 176 families, 908 genera and 3021 species (Prilipko 1939, Ibragimov 2005). It is distributed unevenly along the altitudinal belts. The floral composition of the friganas is very diverse and original. In the present study 260 species of plants in the species composition of friganoid phytocenoses: among which 28 shrub species (10.77%), herbaceous perennials of 212 species (81.54%), one and two biennial species (7.69%). In the composition of



Figs 2-5: 2. *Thymeto-Onobrychetum cornutae ass. nova* ın the Ordubad region. 3. *Astragaletum microcephalae.* 4. *Astragaletum microcephalae.* 5. *Acantholimon bracteatum.*

phytocenosis representatives there are many bulbous ones: *Gladiolus atroviolaceus* Boiss., *Ixiolirion montana* (Labill.) Herbert., *Allium rubellum* Bieb, *A. akaka* S.G. Gmel., *Iris caucacica* Hoffm., *I. pseudocaucasica* A. Grossh., *Muscari caucasicum* (Griseb.) Boker., *Bellevalia pycnantha* (C. Koch) Losinsk., *B. longystyla* (Misck.) Grossh., tuber-rhizome: *Iris lycotis* Woronow., *Juno magnifica* (Wed.) Wed., *Leontice minor* Boiss., *Biebersteinia multifida* DC. and ephemeral plant species *Nepeta micrantha* Bunge., *Clypeola jonthlaspi* L., *Scabiosa rotata* Bieb., *Bromus japonicus* Trunb., *Koelpinia linearis* Pall., *Senecio vernalis* Woldst. et Kit., *Ziziphora tenuior* L., *Taeniatherum crinitum* (Schreb.) Nevski, *Camelina laxa* C.A. Mey., *Ceratocephala falcata* Pers., *Roemeria refracta* D.C. and etc.

In the friganas *Zygophyllum atriplicoides* Fisch. & C.A. Mey., *Artemisia lerchiana* Web., *Rhamnus pallasii* Fisch. & C.A. Mey., *Astragalus microcephalus* Willd., *A. aureus* Willd., *Salvia hydrangea* DC. & Benth., *Allochrusa versicolor* (Fisch. et C.A. Mey.) Boiss., *Capparis herbacea* Willd., *Stachys inflata* Benth., *S. fruticulosa* Bieb., *Atraphaxis spinosa* L., *Acanthophyllum mucronatum* C.A. Mey., *Eurotia ceratoides* (L.) C.A. Mey., *Thymus kotschyanus* Boiss. et Hohen., *Euphorbia marschalliana* Boiss., *Galium verum* L., *Onosma sericea* Willd., *Hypericum scabrum* L., *Pyrethrum myriophyllum* C.A. Mey., *Scutellaria araxensis* Grossh., *Amblyopogon xanthocephalus* (Fisch. et C.A. Mey.) Sosn., *Teucrium polium* L., *Onobrychis cornuta* (L.) Desv., *Phlomis orientalis* Mill., *Anisantha tectorum* (L.) Nevski, *Stipa capillata* L. are mainly found.

In connection with the abundance of dominant plants, the composition and structure of whole formations, associations, microgroups and populations vary greatly.

The number of species in these communities varies between 25 - 30 and 38 - 40, projective coverage is more than 50 - 70 and 75 - 80%. Widespread formations include: *Thymetum kotschianae et Thumetum collinae, Zygophylletum atriplicoideae, Astragaletetum microcephalae, Acantholimonetum, Onobrychetum cornutae, Festuceto-Astragaleto-Thymetum, Stipeto-Thymeto-Onobrychietum, Astragaleto-Thymeto-Onobrychetum.*

In the flora of the South Caucasus region, the genus of *Astragalu*s ranks first, according to species richness and abundance of distribution (Table 1).

This unit is rich in lime and chickpea in the soil. According to the analysis of soil samples, this soil reacts slightly to basic (pH: 7.28). Lime content was 2.6%; phosphorus (P_2O_5) 4.9 kg/da; Potassium (K_2O) at 179.2 kg/da; and the amount of organic matter was found to be 1.44% at a very low rate. The dry grass productivity of the Union is 500 - 1000 gr/m^2.

According to syntaxsonic classification, this unit Astragalo-Bromotea (Quezel 1973) Class the Astragalo-Bromotalia (Quezel 1973) order was trained as a unit belonging to the *Astragaleetion mycrophylae* VA & IA alliance.

In this formation, *Iris reticulata* Bieb. [*Iridodicium reticulatum* (Bieb.) Rodionenko], *Tulipa eichleri* Regel. and *Tulipa schmidtii* Fomin. (Prilipko 1939, Ibragimov 2005) are species collected for the first time.

Formation *Astragaletum* has a many economic importance. The genus *Astragalus* L. on the globe includes 2000 species; through which 849 grow on the territory of the former USSR. In the Caucasus, there are about 235 of them, including 156 in the territory of the Republic of Azerbaijan, according to "Flora of Azerbaijan" (Karyagin 1954, Mikailov 1964, Prilipko 1939); in Nakhchivan AR 54, species are present. However, in this region based on the 2008-year materials the amount of species of *Astragalus* reach 85, but based on the materials of year 2016 reach 91 species, which is 58.33% of all *Astragalus* flora of Azerbaijan. In the 1970 - 2005 years, new records of *Astragalus* were collected and identified: *Astragalus andreji* Rzazade, *A. aureus* Willd., *A. finitimus* Bunge, *A. glycyphyllos* L., *A. glycyphylloides* DC., *A. dasyanthus* Pall. L., A. *lunatus* Pall., *A. contortuplicatus* L., *A. alexandri* Charadze (Ramenskiy 1971), and *A. stevenianus* DC., *A. mollis* Bieb were first identified in 2016 on the territory of Nakhchivan. In the different phytocenoses of the mountainous - xerophytic vegetation, the following 11 gum *Astragalus* erogens are described below *A. stenonychioides* Freyn & Bornm., *A. andreji*, *A. aureus* Willd., *A. insidiosa* Boriss. *A. microcephal*us Willd., *A. vedic*us Taktht., *A. meyeri* Boiss., *A. apricus* Bunge, *A. szovitsii* Fisch. & C.A. Mey., *A. lagopoides* Bunge (Ganbarov and Ibragimov 2015a, 2015b).

According to syntaxonomic classification, this unit Astragalo-Bromotea Quezel was trained as of the Astragalo-Bromotalia Quezel 1973 Ordos the Thymeto-Onobrychetum cornutae ass. nova VA & EI 2017 association (Table 2).

Table 1. Phytosociological features of *Amygdaleto-Astragaletum microcephalae* VA & EI 2017 association.

Example parcel No.	65	57	66	68	69	111	112	116	118	220	125	126	127	
Area width (m^2)	150	150	150	250	250	250	100	150	100	100	200	200	150	
Height from sea (m)	1450	1455	1460	1470	1475	1480	1485	1490	1495	1500	1505	1510	1515	
Slope (%)	10	15	10	10	10	10	15	15	15	10	10	10	15	
Direction	D	D	D	GD	GD	GD	GD	GD	GD	GD	GD	GD	GD	
Horse height (cm)	55	50	50	55	60	65	55	55	65	55	55	55	60	
To motherboard	KT	KT	KT	KT	KT	KT	KT	KT	KT	KT	KT	KT	KT	
Number of types	18	13	12	13	13	12	12	13	13	12	13	13	14	
Ground cover (%)	50	60	55	50	50	60	50	75	50	50	65	75	70	Class contribute
Character species of the assosation														
Astragalus microcephalus	+2	+2	33	33	22	22	11	11	11	22	22	33	33	V
Astragalus aureus	+1	+1	+2	.	+1	22	22	+2	+2	+1	+1	+2	22	V
Amygdalus fenzliana	+2	+2	22	.	22	.	+2	.	+2	+2	.	.	+1	IV
Character species of the Alliance *Asracanthetion mycrophyllae*														
Pyrus oxyprion	+2	.	+1	+2	.	+1	+1	+2	+2	.	+2	+2	+2	IV
Arabis caucasica	+1	+1	+2	.	11	.	11	.	11	+1	+1	.	.	III
Sedum sempervivoides	+1	.	+1	.	+1	+1	.	+2	+2	.	+2	.	.	II
Character species of the Order *Astracantho-Brometali*														
Verbascum pyramidatum	+1	+2	+2	+2	+2	+2	+2	+2	.	.	+2	.	.	IV
Atraphaxis spinosa	+1	+1	11	+2	+1	.	.	.	+1	+2	.	+1	12	III
Iris reticulata	+1	+1	.	22	.	22	.	.	.	.	11	11	.	II
Character species of the Classes *Astragalo-Bromoteae*														
Draba globifera	+2	+2	+2	+2	+1	+1	+1	+2	+2	+1	+1	+1	+1	VI
Lolium persicum	+2	+2	.	.	+2	+2	.	.	+2	+2	+2	.	.	III
Agropyron cristatum	+1	.	+1	+1	.	.	.	+1	+1	+1	.	.	.	II
Companions														
Minuartia oreina	+1	+1	+1	+1	+1	.	+2	+2	+2	.	.	.	.	III
Paronychia kurdica	.	.	.	+1	+2	+2	+1	+1	+1	.	.	+1	+1	II

Contd.

Example parcel No.	65	57	66	68	69	111	112	116	118	220	125	126	127	
Herniaria caucasica	+1	.	.	+1	.	.	.	.	.	.	+1	.	.	I
Pulsatilla violacea	.	.	.	.	.	.	.	.	+1	+1	+1	.	.	I
Ficaria fascicularis	.	+1	+1	.	.	.	.	.	.	.	.	.	+1	I
Thalictrum isopyroides	+1	.	.	.	.	.	.	+1	.	.	.	+1	.	I
Astragalus karjagini		11	.	.	+1	.	.	.	.	.	.	.	.	I
Arabis caucasica	.	.	.	22	+1	.	11	.	.	.	.	.	.	I
Phryne huetii	.	.	+1	.	.	11	+1	.	.	.+1	.	.	.	I
Peltariopsis planisiliqua	.	.	.	.	.	.	.	+1	.	.	.	.	+1	I
Ficaria fascicularis	11	.	.	.	.	.	.	.	.	.	.	+1	.	I
Iris reticulate	.	.	.	.	+1	.	.	.	11	.	.	.	.	I
Ixiolirion montanum	+1	.	.	.	.	.	.	+1	.	.	+1	.	.	I
Arabis caucasica	.	.	.	+1	.	.	.	.	.	.	.	.	+1	I
Iris imbricata	.	.	.	.	.	.	.	.	.	11.	+1	.	.	I
Grammosciadium platycarpum		11					12							1
Prangos ferulacea						11						+1		1
Bupleurum polyphyllum		+1							11					1
Pimpinella peucedanifolia					+1						+1			1
Heracleum pastinacifollium	+1									+1				1
Malabaila sulcata							+1	+1						1
Plumbago europaea			11										+1	1
Teucrium polium						+1								1
Nepeta buschii		+1								+1				1
Phlomis orientalis				11								+1		1
Callipeltis cucullaria							+1		+1					1
Pyrethrum rdubadense	+1				+1									1

Table 2. Phytosociological features of *Thymeto-Onobrychetum cornutae* ass. nova VA & EI 2017 association.

Example parcel No.	1	2	3	4	5	6	7	8	9	10	Class contribute
Area width (m^2)	100	100	100	200	150	150	150	150	250	250	
Height from sea (m)	1500	1520	1550	1570	1600	1620	1650	1670	1700	1730	
Slope (%)	10	12	5	10	10	5	2	5	0	5	
Direction	G	G	G	G	GD	GD	G	GD	GD	GD	
Horse height (cm)	20	18	20	20	17	16	16	17	20	16	
To motherboard	15	15	15	17	14	15	18	19	15	17	
Number of types	60	60	60	50	60	60	70	70	60	70	
Character species of the assosation's											
Onobrychis cornuta	33	12	11	23	33	22	11	32	22	33	V
Astragalusmicrocephalus	.	+1	+1	+1	+2	.	+1	.	+1	.	III
Thymus kotschyanus	+1	.	.	+1	.	11	.	+1	+1	.	III
Iris reticulata	+2	.	+1	.	11	.	12	.	+1	.	III
Character species of the Alliance Thymeto-Onobrychyon											
Astragalus karjagini	+1.	.	+1	.	.	+1	11	+2	11	+2	IV
Draba globifera	12	+1	.	.	11	.	+2	.	.	+1	III
Character species of the Order Thymeto-Onobrychetalia											
Astragalus aureus	+1	.	+1	11	.	.	+1	11	.	+1	III
A. oleaefolius	.	12	+1	+2	.	+1	+1	.	+1	+1	IV
Arabis caucasica	+1	.	+1	.	.	11	+1	.	+1	+1	II
Character species of the Class Astragalo-Brometea Quezel 1973											
Astragalus flavirubens	.	+1	.	.	.	+1	11	+1	.	12	III
Thymus collinus	.	+1	+1	.	13	.	.	11	.	13	III
Teucrium polium	11	13	11	12	13	.	+1	.	13	.	III
Sedum sempervivoides	.	.	+1	.	.	.	.	.	+2	.	I
Companions											
Juniperus polycarpos	.	11	.	+1	.	.	.	+1	.	.	II
Prangos ferulacea	.	+1	+1	.	.	+1	+1	11	.	.	III
Bromopsis variegate	+1	.	+1	.	.	.	.	.	.	+1	II
Amygdalus fenzliana	.	.	.	+1	.	+1	.	.	.	.	I
Asplenium septentrionale	.	+1	.	.	.	.	+1	.	+1	.	II
Ceterach officinarum	.	.	+1	.	+1	.	.	+1	.	.	II

Contd.

Example parcel No.	1	2	3	4	5	6	7	8	9	10	
Alopecurus textilis	+1	.	.		.	+1	.	.	.	.	I
Trisetum rigidum	.	11	.	+1	.	+1	.	+1	.	.	III
Sesleria phleoides	+1	.	.	.	+1	.	+1	.	.	+1	II
Melica persica var. *inaeguiglumis*	.	+1	.	.	.	.	+1	.	+1	.	II
Poa polychroa	.	.	.	.	.	+1	+2	.	.	.	I
Bromopsis variegata	.	+1	.	.	+1	.	.	+1	.	.	II
Lolium persicum	+1	.	+1	.	.	.	.	.	.	+1	II
Agropyron cristatum	.	.	+1	.	.	+1	.	.	+1	.	II
Eremurus spectabilis	.	+2	.	.	.	.	+1	.	.	.	II
Gagea caroli-kochii	.	+1	.	.	.	.	+1	.	.	.	I
Allium schoenoprasum	.	+1	.	+1	.	.	.	+1	.	.	II
Tulipa julia	+1	.	+1	.	.	+1	.	.	.	+1	II
T. eichleri	+1	11	.	+1	.	.	.	+1	.	.	III
T. florenskyi		+1			+1						I
T. schmidtii							+1				I
Ixiolirion montanum										+1	I
Iris lycotis		+1						+1			II
I. imbricata					+1						I
Atraphaxis spinosa			+1						+1		I
Minuartia oreina	+1					+1					I
Paronychia kurdica				+1				+1			I
Herniaria caucasica						+1				+1	I
Pulsatilla violacea		+1					+1				I
Ficaria fascicularis					+1				+1		I
Thalictrum isopyroides			+1								I
Papaver fugax						+1					I
Isatis bungeana		11			+1			+1			III
Aethionema fimbriatum				+							I
Peltariopsis planisiliqua			+								I
Phryne huetii	+										I
Arabis caucasica			+		+		+				II
Draba globifera		+							+1	+1	II
Minuartia oreina					+						I
Rhamnus pallasii	+			+1				+			II

Phytocenoses of each of this gum rocks *Astragalus* differ in species composition, saturation, growth at different heights, depending on the steepness of the slopes and various soils - climatic conditions. They grow in arid places on poor soils, along rocky, stony, and gravelly mountain slopes up to an altitude of 1500 - 2600 m above sea level. In the densest thickets, there is 1 hectare to 10,000 bushes of operational age. In the formation of cracks in the trunk cortex or artificial incisions, a dense mass emerges, withering in a few days. The resulting product is called a "Kitra" gum or tragacanth. In other botanical-geographical regions of Azerbaijan and Nakhchivan AR collection of gums began in 1951. In Nakhchivan AR is collected only from *Astragalus microcephalus,* Willd. Phenological observations and experimental studies have shown that the yield of gum decreases with the altitude belt (1-bush yields between 1 - 7 g and 15 - 20 of gum). *Astragalus* gum in medical practice used as a covering agent for the wounds of the digestive organs and the gastrointestinal tract. It is used as a binder in the preparation of emulsions, tablets and pills. Widely used in the light and food industries as a harmless thickener (Mikailov 1964, Ibragimov 2005).

As a result, for the first time a classification of the mountainous - xerophyte vegetation was developed. Classification of vegetation is the division of the aggregate that form the vegetation of communities into groups according to any similar feature or several features. The main taxonomic units adopted in geobotany are the type and formation. The vegetation cover consists of numerous phytocenoses, which have a different degree of similarity with each other.

In order to understand all the diversity of these phytocoenoses, their classification has been established, certain taxonomic (systematic) units have been established: association, group of associations, class of associations, formation, group of formations, class of formations and type of vegetation. In geobotanics, an association is considered as the smallest systematic unit, and the highest type of vegetation, a formation, as a large systematic unit. Similar plant formations are combined into larger systematic units into groups and formation classes. The main unit of the vegetative cover should be considered the association adopted at the Brussels International Botanical Congress in 1910. After this Congress, the geobotanical schools of different countries: The Soviet school, the floristic (French) school, etc., developed and refined the definition of association, while preserving its importance as the main unit of vegetation cover, where it is used in various ways. Currently there is no consensus on the classification of vegetation, and different researchers solve them in different ways. Without claiming to be original in solving this problem, the most common phytocenotic, ecological principles were adopted and general schemes developed by Shennikov (1938), Hajiyev (1970), Ramenskiy (1971), Ibragimov (2005), as well as his own experience and personal considerations. The type of vegetation is distinguished by ecobiomorph - trees, bushes, shrubs, and half-shrubs, perennial and one-two-year-old grasses. Ecological and systematic features determine the class of formations. For example, real large-grass meadows, groups of formations united by formations of one somewhat dominant (from dominants). Formations consist of associations with dominants of the same species (Whitewashed, knotted, meadow-leafy). The association is determined by the appearance of a dominant and it is dominant, for example, white clover clypei, etc.

A scheme for the classification of the mountainous-xerophyte vegetation of the Nakhchivan AR, and the name of associations is given by prevailing species and in some cases by determinants (Ramenskiy 1971). In this classification scheme, the names of the pricing dominants, subdominants and edificatory are indicated in parentheses in Latin. In developing of this classification, personal considerations were also used, many new materials and features, which laid the main results of the present floral and geobotanical studies. In classifying the vegetation of the Nakhchivan AR mountain-steppe and highland xerophytic vegetation (Ibragimov 2005), took as a type of vegetation.

One of the widespread formations is Acantolimoneta with two associations: *Acantholimonetum kareliniosum* and *A. araxanuosum.* On the territory of the Nakhchivan Autonomous Republic, Acantholimonetum assosation is represented by 9 species: *Acantholimon araxanum, A. armenum* Boiss. & A. Huet, *A. bracteatum* Boiss., *A. caryophyllaceum* Boiss., *A. glumaceum* Boiss., *A. hohenackeri* (Jaub. & Spach) Boiss, *A. karelinii* Bunge, *A. sahendicum* Boiss. & Buhse, *A. quinquelobum* Bunge. They are components of various phytocoenoses of the mountainous-xerophytic and mountain-steppe vegetation. Sometimes they create mixed phytocenoses and manifest themselves as dominants or so dominants (Gurbanov, Jabbarov 1999, Gurbanov 2004, Ibragimov 2005).

Upland xerophytes (friganoid vegetation) Garigue; Gardens-oases in place of friganoid semi-desert and mountain-steppe vegetation. Scheme for the classification of mountainous-xerophyte vegetation.

From this classification scheme it can be seen that mountainous - xerophytic vegetation on the territory of Nakhchivan AR is represented by 3 subtypes, 6 class formations, 20 formations and 22 associations.

The species composition of these communities is not rich; it consists of 48 - 53 species. Projective coverage is 75 - 80%. Representatives of shrubs, shrub cushions, shrubs and shrubs, herbaceous perennials, dwarf loose-shrub grasses, herbaceous perennials (two-year-olds), onions, tubers, rhizomes, ephemerals, annuals are distributed in the composition of different phytocenoses with the participation of single specimens or by the abundance of Acanthalimones (Table 3).

Here there are many species that grow only in the investigated region, such as *Ferula oopoda* (Boiss. & Buhse) Boiss., *Dorema glabrum* Fisch. & C.A. Mey, *Aristolochia bottae* Jaub. et Spach., *Zygophyllum atriplicoides* Fisch. & C.A. Mey., *Astragalus aureus* Willd., *Salvia hydrangea* DC. ex Benth., *Atraphaxis angustifolia* Jaub. & Spach., *Allochrusa versicolor* (Fisch. & C.A. Mey.) Boiss. *Iris lycotis* Woronow., *Iris lycotis* var. *magniphica* Grossh., *I. imbricata* Lindl., *Allium akaka* S. G. Gmel. ex Schult. & Schult. f. *A. leonidii* Grossh. and others.

Thymeto-Acantholimonetum bracteatumae VA & EI 2017 of the north-western slopes near the villages of Bist-Nurgut of the Ordubad District.

According to syntaxonomic classification, this unit Astragalo-Bromotea (Quezel, 1973) Class, The Astragalo-Bromotalia (Quezel 1973) Ordosbelonging to the Thymeto-Acantholimonetum bracteatae VA & EI 2017 assosation.

Phytocenoses of the mountainous-xerophyte vegetation are of little use for pasture They can serve as transitional pastures for grazing after the use of winter pastures and before rising to summer pastures. They are the basis for collecting medicinal and technical plants, plant materials with the aim of fixing eroded slopes, creating haymaking meadows and improving pastures.

In the mountainous regions, in the rocky and peach habitats, in the arid, vegetation-resistant, non-saline, challenging and eugene-rich soils, short-hauled shrubs, rodents and xeromorphic herbs (peanut, hard-leafed and short, thorny, feathery, cushion-shaped, mechanically developed) vegetation-type mountain xerophyte vegetation.

The term for mountain-xerophyte vegetation was first described by Kuznetsov, then Bush, Grossheym, Tahtachyan, Arustamova and so on. Botanists have been used in various ways (high-mountainous steppes, oreoxerophyte vegetation, xerophyte vegetation of the skelet mountain, frigana vegetation, high-mountainous steppes etc.).

The development of this vegetation is a type of vegetation that is important for its seasonal distribution, rather than the total amount of annual precipitation, and it is important that the drought corresponds to the summer period. Mountainous-xerophyte vegetation in the Caucasian

Table 3. Phytosociological properties of *Thymeto-Acantholimonetum bracteatae* VA & EI 2017 association.

Example parcel No.	31	35	36	37	38	39	40	43	44	45	
Area width (m^2)	150	150	150	100	100	100	100	100	250	250	
Height from sea (m)	1550	1553	1540	1545	1554	1543	1553	1553	1550	1552	
Slope (%)	15	20	20	15	20	20	15	15	20	15	
Direction	K	K	K	K	K	K	K	K	K	K	
Horse Height (cm)	20	18	20	20	20	16	16	20	20	20	
To motherboard	15	12	15	17	14	15	18	15	15	17	
Number of types	40	50	50	50	40	50	35	40	40	50	Class contribute
Character species of the assosation's											
Acantholimon bracteatum	21	22	21	13	23	23	11	11	33	21	V
Thymus collinus	11	21	.	11	+1	11	.	11	11	.	III
Prangos ferulacea	22	11	+1	.	+1	.	+1	.	.	22	III
Character species of the Alliance Thymeto-Acantholimonion .											
Scabiosa bipinnata	+1	+1	.	+1	11	.	.	11	+1	.	IV
Achillea vermicularis	.	11	+1	.	+1	+1	.	.	+1	+1	IV
Character species of the Order Astragalo-Acanthalimonetalia											
Crataegus orientalis	+1	.	.	+1	.	.	+1	.	+1	.	II
Bupleurum polyphyllum	11	+1	.	+1	+1	.	.	.	.	+1	II
Character species of Class Astragalo-Brometea Quzel 1973											
Teucrium polium	13	13	.	+.	13	.	23	.	33	.	II
Verbascum pyramidatum	.	.	.	+1	+1	.	.	.	11	.	
Thymus kotschyanus	+1	+1	13	.	+3	.	.	13	.	13	III
Stachys iberica	.	+2	12	+2	+2	.	.	.	+2	.	I
Companions											
Diphelypaea coccinea	.	+1	.	+1	.	.	.	+2	.	.	II
Plantago saxatilis	.	+1	.	+1	.	.	.	+2	.	.	II
Callipeltis cucullaria	.	+1	.	.	+1	.	.	+1	.	.	II
Cephalaria procera	.	+2	.	.	+1	.	+2	.	+1	.	II
Lonicera iberica	.	.	.	+1	.	.	.	.	.	+1	II

Contd.

Example parcel No.	31	35	36	37	38	39	40	43	44	45	
Michauxia laevigata	+1	.	+1		.	.	.	.	+1	.	I
Asyneuma pulchellum	.	.	.	+1	.	.	.	.	.	.	I
Helichrysum pallasii		.	.	.	.	+1	.	.	.	+1	I
Anthemis iberica	.	+1	.	.	+1	.	+1	.	+1	.	II
Pyrethrum ordubadense	.	.	.	.	.	+1	+2	.	.	.	I
Senecio taraxacifolius	.	+1	.	.	.	.	.	+1	.	.	I
Vicia nissoliana	+1	.	+1	.	.	.	.	.	.	+1	II
Acer ibericum	+1	11	.	+1	.	.	.	+1	.	.	II
Rhamnus pallasii	.	+1	.	.	+1	.	.	.	+1	.	I
Centaurea sguarrosa	.	+1	.	+1	.	.	.	+1	.	.	II
Scorzonera latifolia	+1	.	+1	.	.	+1	.	.	.	+1	II
Daphne kurdica	.	.	.	.	.	+1	+1	.	.	.	I
Gramosciadium platycarpum	.	.	.	.	+1	.	.	.	+1	.	I
Prangos ferulacea	.	.	.	+1	.	.	.	+1	.	.	I
Malabaila sulcata	+1	+1	.	.	.	.	+1	.	.	.	I
Plumbago europaea	.	.	.	.	+1	.	.	.	+1	.	I
Nepeta buschii	+1	.	.	.	.	.	+1	.	.	.	I
Ziziphora clinopodioides	.	.	.	.	+1	.	.	.	.	.	I
Acantholimon glumaceum	+1	.	.	.	.	.	.	.	.	+1	I
Physoptychis caspica	.	.	+1	.	.	+1	.	.	.	.	I
Cotoneaster melanocarpus	.	+1	.	.	.	.	.	.	11	.	1
Amygdalus fenzliana	.	.	.	+1	.	.	.	.	.	.	1
Cerasus microcarpa	.	.	+1	.	.	.	.	+1	.	.	1
Oxytropis cyanea	+	.	.	.	.	.	+1	.	.	.	1
Draba bruniifolia	+1	.	.	.	11	.	.	.	.	.	1
Sempervivum transcaucasicum	.	11	.	.	.	.	.	.	.	+1.	1

region is divided into three forms (Sokhadze 1968, Prilipko 1970, Arustamova 1973), including tomillaras, tragacanthes and frigans.

The monuments are the units where thymus-dominated taxa are dominant. The taxa are *Salvia dracocephaloides* Boiss., *Stachys inflate* Benth., *Thymus kotschyanus* subsp. *kotschyanus* Boiss. & Hohen., dominant species, sometimes pure, sometimes mixed (with *Ephedra procera* Fisch. & Mey., *Artemisia fragrans* Willd., *Atraphaxis spinosa* L., *Acantholimon bracteatum* Boiss., *A. glumaceum* (Jaub. & Spach.) Boiss., *Astragalus microcephalus, Astragalus aureus* species).

Tragacities - The barbed bush, spread from Crimea to the west of Tien Shan and spreading across the Caucasus (Kuban to the mountainous parts of northern Asia, Dagestan, Armenia, Azerbaijan (Nakhchivan and Zuvant (Lerik Province) and Georgia) and vegetations, dominated by the rhizomes (Astragaletum, and Acantholimonetum). In Central Asia, these vegetation-type associations are distributed in Kopet-mountain, Kugutang-tay, Turkmen Range, Zerifshan River Basin, Pamir and Central Tien Shan.

There are numerous small leafy bushes and cushioned plants that are xerophytized into tragacities in the territory of Azerbaijan. *Amygdalus fenzliana* Korsh., *Rhamnus pallasii* and *Rhus coriaria* are on the other hand shrubs in the territory.

Nakhichevan Autonomous Republic of Azerbaijan is one of the regions where the vegetation is enshrined. Talibov and Ibragimov (2008) have shown that they have a taxon of more than 2935 in the Nakhchivan Flora. Grossheim (1948), Prilipko (1939) and later Ganberli (1973) reported the vegetation of the region as well as the frigana plant species. Floristic and phytosociological studies carried out by Hajiyev (1970), Gurbanov (2004), Talibov and Ibragimov (2008), also found this plant species in Azerbaijan's diaper regions (Talish Mountains, Bozdag Ridge, Central Highland Sections of Minor Gaucasus and it has also been found in the mountainous parts of Nakhchivan. From classification scheme it can be seen that mountainious-xerophytic vegetation on the territory of Nakhchivan AR is represented by 3 subtypes, 6 class formations, 20 formations and 22 associations.

As a result of this study, the phytosociological properties of the research area were covered. The friganian knowledge, which has been widely distributed in mountain xerophyte habitats in the vegetation of the region, has been covered with their floristic and phytosociological structures like Acantolimometum, Astragaletum, Onobrychetum, Juniperetum, Amygdaletum, Thymetum and so on. It has been determined that the units are spreading in larger areas. In view of climatic and soil conditions, frigana units have been spattered in the background of the mountain steppes, whereas in the xerophytes habitat environment, these units are more resistant and resistant to the ambient conditions.

Highly osmotic pressure and mechanical tissue elements of these highly developed plants, are found on rocky and stony slopes. These plants have a wind-resistant and compact living-cushioned body and a thick coke system. These plants, which are resistant to wind and transpiration speeds, have the ability to adequately protect water loss.

The compact ground parts allow them to successfully succeed in hard winter in the winter. Primitive factor plays an important role in the development of mountain xerophyte vegetation. Topographically, the distribution of mountain xerophytes, the angle of the slopes, the degree of inclination, the soil and the rock type are important.

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