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Naturally spreading of the *Hyacinthaceae* Batsch. in the Altitude Zones of the Nakhchivan Autonomous Republic flora of Azerbaijan

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Abstract
The article deals with naturally spreading of the *Hyacinthaceae Batsch.* family plants in the altitude zones of the NAR flora.We are guided by the results of the reserches carried out in the NAR territories during 2010-2014 years. There have been collected herbarium samples of each species during the field researches in these years, and also noted the naturally spreading zones of each species in the highland zones. Naturally spreading of the Hyacinthaceae Batsch. species have been studied in 3altitude zones: Along the Araz river side, in the mid-highland and upper-highland zones. There have been studied the composition of the Hyacinthaceae Batsch. species and formation of their plant groupings.

Keywords: areal, geophit, kserophit, altitude zones, alpine, subalpine, nival, subnival.

Introduction
Nakhchivan Autonomous Republic is one of the southern regions of the Transcaucasia. The territory of the Autonomous Republic is in the 38 degrees 51-39 47 North latitude and 44 46-46 East longitude. So it is the same latitude with the Jarjou region-Turkmenistan Republic, Gashga-Derya Region-Uzbekistan Republic, Mountinious Bedekhshan Autonomous Region-Tajikistan Republic, Talish region-Azerbaijan, the Japanese Islands, southern territories of Spain and Portugal.
As the Republic has got rich flora, the intensive migration of the flora is connected with strong hybridizing process, the soil and climite condition in this region. Difference of the climite condition, ecofitocenotic conformity to natural laws and acclimatizing of the vegetation to the local condition cause different shape spreading in different altitude of this historically complex geological zone. The amplitude difference of the Autonomous Republic Territory absolute altitude changes between 600 m. (near the village Kotam-The Araz river valley) and 3906 m.(Gapijic peak) [S.Y.Babayev 1999] [1].
For the First time Y.S.Medvedyev showed spreading of the vegetation according to floristic principles in the Caucasus and also he determined the vegetation types [Y.S.Medvedyev, 1999]. A.A. Grossheym, L.I. Prilipko and others accepted the climate condition as a main principle in spreading the vegetation according to the zones of the Caucasus. [Grossheym, 1948; Prilipko 1939] [8].
During the researches that we have held in the Nakhchivan AR flora up today, there have been studied the systematics, bioecological pecularities, the role in the vegetation groupings, spreading of some geofits in different altitude zones and useful species of the *Hyacinthaceae* Batsch. [Salayeva, 2013, 2014; Salayeva and others., 2011; Ibrahimov and others., 1988].
At present we have decided to study naturally spreading in the zones of the *Hyacinthaceae* Batsch. species in the Nakhchivan Autonomous Republic flora. During the researches we accepted botanical-geographical regions of Nakhchivan as a basis. [Talibov and others., 2008]. A.Sh. Ibrahimov added mountainious-tundra botanical-geographical region into this division. The author divided the Autonomous Republic territory according to the altitude. [Ibrahimov, 2005].

Material And Method- The research work has been carried out in the Nakhchivan Autonomous Republic regions in 2011-2014. During the expedition and field researches there have been collected herbarium samples of all the species.
More than 230 species of *Hyacinthaceae* Batsch. have spread in the world, as well as 64 species in the Caucasus and 34 species in Azerbaijan. [Azerbaijan Flora, 1952]. 22 species out of them have spread in the NAR territory. During the geobotanical investigations there have been used

generally accepted methods. [Field Geobotanica, 1960; Programs for Geobotanic..., 1932; Shennikov, 1962]. The similarity degree of the compared taxonomic composition around the zones has been calculated by Serensen-Chekanovski formula: ***Ksc=2c/a+b.*** Here **a** shows the number of species in one zone**, b** shows the number of species in other zone and **c** shows the general number of species of both zones. [Yaroshenko, 1961].

Experimental Part- On studying the vegetation of the investigated zones there have been mainly studied the botanical-geographical regions and shown the floral composition and the number of *Hyacinthaceae* Batsch. species of each botanical-geographical region. At present we are going to study the objective laws of *Hyacinthaceae* Batsch. species spreading in different zones of the NAR territory. We made researches in the botanical-geographical regions of Nakhchivan. [Talibov and others..., 2008]. E.Sh.Ibrahimov added highland-tundra botanical-geographical zone to this division. The author differs the NAR territory according to the altitude. [Ibrahimov, 2005].

During the researches we grounded on the resemblance degree principle of the compared taxonomic composition of the zones. We grounded on the ecological situation of the zones and studied spreading of the species in these zones.

As seen in the table, according to the number the Hyacinthaceae Batsch species have mostly spread in the altitude zones-13 species (18.84%), 12 species in the mid-highland zones (17,39%), 9 species in the lower and subalpine zones (13,05%), 8 species in the alpine zones (11,59%), 7 species in the mountain skirts (10,14%), 6 species in the lowland (8,69%) zones. The least number-3species (4,36%) have spread in the subnival and 2 species (2,89%) in the nival zones. During the researches we noted the abundance, phenophaze, the role in the vegetation type and other geobotanical pecularities (height, vitality, design cover, etc) of each species and also made the list of the plants (Fig).

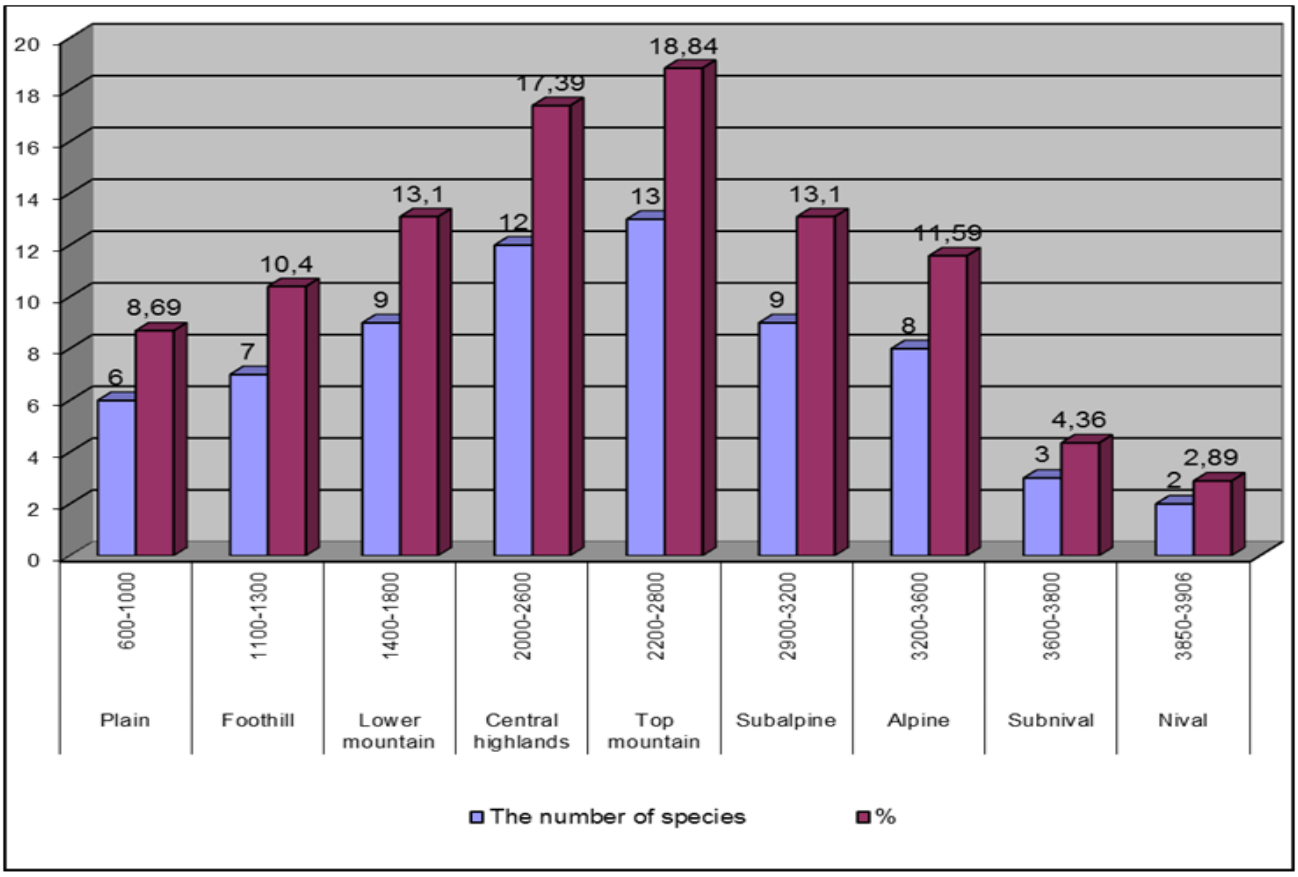

Fig: Spreading of Hyacinthaceae Batsch species in the altitude zones

The Araz riverside lowland zone is of 600-1000 m. high and covers 32% of the NAR territory. This zone covers mountain skirts (1100 m) and lowlands from north-west to south-east. The desert and semi-desert plants have mostly spread in this altitude zone. The desert plants have horizontally spread in the narrow zone along the Araz riverside. The plants have spread in the gray, light brown saline lands. Though the desert plants are sparse, they have compound type composition and a short vegetation period.

Most of the mid-highland zones are covered by mountain meadows and bushes. The territory is divided by lots of dry valleys. Here we see highland-meadow soils. Mostly meadow-bushy, cserophit plants grow in this territory. In the east of the Chalkhangala village, near the Payiz and Turkesh villages and in the left bank of the Nakhchivanchay river, the west side of Gushgayasi and Saridagh, there have spread wormwood-friganoid plants in the light-brown mountain soils. Frigana zone form mixed plant species in the wormwoody semi-deserts. But going upwards we meet independent altitude cserofit plants zone. This zone covers a large area around the villages of Jahri, Vaykhir, Payiz, Khalkhal, Chalkhangala. The clination of the relief causes the frigana type difference of the vegetation and richness of the fitoceneses. So, it completely differs from the wormwoody semi-deserts. The other pecularity of the noted vegetation type is that the parennial grass cover the greates part of the area. Beginning

with early spring the herbs begin to replace one another. In spring the bulbous and rhizome herbs and some parennial grass grow rapidly, bloom and seed. Though the cserophit herbs grow in droughty, they complete their development. In early summer, when the parennial herbs bloom, they look especially beautiful.

During the researches we noted the abundance, fenofaze, the role in the vegetation type and other geobotanical pecularities (height, vitality, design cover, etc) of each species and also made the list of the plants. (Table).

At the result of the researches we noted the following species in the lowland and mountain skirt zones: *O. navaschinii* Agapova (O. tenifolium Guss.) (Boyukduz 18.05.2010, Shahtahti 29.05.2011), *Bellevalia macrobotrys* Boiss. (*B. zygomorpha* Woronow) (Givrag 05.06.2011, Gulustan field 25.05.2010), *Muscari longipes* Boiss. (Jamaldın 12.05.2011, Erezin 20.05.2012), *M. szovitsianum* Baker (Uzunoba 21.05.2012, Jahri 21.05.2013), *M. neglectum* Guss. (*M. leucostomum* Woronow) (Sadarak 28. 05. 2010, 01.06 2014 Arpachay). At the result of the researches we discovered the following species in the mid-highland zones: *Muscari caucasicum* (Griseb.) Baker (Turkesh 15.06.2012, 18.05.2012), *Bellevalia pycnantha* (C. Koch) Lozinsk. (Ilanlidagh 08.05.2012;Erefse 12.06.2012, 14.06.2014 Teyvaz, 20.), *Muscari* Freyn & Sint. (Batabat 07.06.2013), *Scilla caucasica* Miscz. (Khazinedere 15.05.2013; Dereboghazı 20.05.2014) etc.

Going towards highlands the vegetation types replace one another. We meet the drought resistant mountain-cserophit bushes first in the small dry areas, then in a bit higher in the soil mearge areas, in the severe-hot gravelly areas with poor vegetation. The amount of *Hyacinthaceae* Batsch. species is much enough in the investigated areas. Mountain vegetation types are divided into three groups: mountain cserofit herbs, garigas and mountainious meadow herbs. The mountain vegetation that have spread in the investigated regions cosists of 5 formation classes. Such kind of formations are mainly met in the dry gravelly slopes. Such kind of changes are not the same in the slopes, valleys, dells, hills. In some areas the bushes are replaced with grass but this vegetation type keep its features.

Environmental and biological features *Hyacinthaceae* Batsch.

№	Naming of species	Geographical distribution	Abundance	Ecological features		Altitudinal zones (M)	Type areal
				Flowering	Education seeds		
1.	*Bellevalia macrobotrys* Boiss.	High mountain plains	3	IV	V	600-2300	East Transcaucasia
2.	*B. longistyla* (Miscz.) Grossh.	Following middle mountain	3	IV	V	1400-2250	Atropatan
3.	*B. montana* (C.Koch.) Boiss	The plain-down mountain	3	IV	V	600-1800	Unknown
4.	*B. pycnantha* (C.Koch.) Losinsk.	Medium high mountain	2	V	VI	2000-2800	Iranian mountain
5.	*Muscari longipes* Boiss.	High mountain - Alpine	2	V	VI	2200-3906	Pannon-pont
6.	*M. tenuflorum* Tausch.	The plain-alpine	4	VI	VII	600-3600	Pannon-pont
7.	*M. caucasicum* (Griseb.) Baker	The plain-alpine	2	V	VI	600-3600	Caucasus-Northern Iran
8.	*M. armeniacum* Leichtlin ex Baker	High mountain plains	1	V	VI	600-2300	Asia Minor
9.	*M. neglectum* Guss.	Plain-down mountain	3	III	V	600-2300	Iran Turan
10.	**Hyacinthella. orientalis L.*	Rarely in the gardens	1	V	VI	-	East -Mediterranean
11.	*Ornithogalum ponticum* Zahar.	Plain- mid-mountain	4	VI	VII	600-2400	Mediterranean Sea, Atlantic
12.	*O. brachystachys* C. Koch	Mid-mountain-subalpine	4	VI	VII	2000-2800	Front Asia
13.	*O. arcuatum* Stev. Aggr	Mid-mountain-subalpine	2	VI	VIII	2000-2600	Caucasian
14.	*O. montanum* Cyr.	Plain-mid-mountain	4	V	VI	600-2400	Front Asia
15.	*O. transcaucasicum* Miscz. ex Grossh.	High-mountain	2	VI	VII	2200-2800	Northern Atropatan
16.	*O. balansae Boiss.*	Middle-high-mountain	3	V	VII	2000-2800	Northern Iran
17.	*O. sigmoideum* Freyn & Sint.	High-mountain - alpine	3	V	VI	2200-3200	Atropatan
18.	*O. navaschinii* Agapova	The plain-average mountain	4	III	V	600-2400	Balkan- Asia Minor
19.	*Scilla caucasica* Miscz.	Medium high mountain	3	III	IV	2000-2800	Hyrcanus mountain
20.	*S. mischtschenkoana* Grossh.	High mountain-nival	4	IV	V	2200-3906	Atropatan
21.	*S.zangezura* Grossh.	High mountain-nival	2	V	VI	2200-3600	Atropatan
22.	*Puschcinia scilloides* Adams	Central mountain-nival	2	V	VI- VII	2000-3850	Northern Iran

Ornithogalum ponticum Zahar.

Puschcinia scilloides Adams

Muscari longipes Boiss

Bellevalia macrobotrys Boiss.

Scilla mischtschenkoana Grossh.

Muscari tenuiflorum Tausch.

Grain plants couch-grass and bushes are the constant components of the field vegetation. Here the dry invirenment is a cause for a short vegetation period of the herbs. Comparing with meadows it is the sign of cserofity but not mezophility. In Milakh, Erefse, Bayahmad, Bilev, Channab, Nursu, Kuku, Bichanak and other areas we can meet the *Scilla caucasica Miscz*., *Ornithogalum navaschinii* Agapova (*O. tenifolium* Guss.), *Ornithogalum montanum* Cyr. (*O.graciliflorum* C.Koch; *O. platyphyllum* Boiss, *Bellevalia longistyla* (Miscz.) Grossh., *Muscari tenuiflorum* Tausch., and other species of the formation. Within the composition of this formations they act as subdominants, edificators and components.

On formation of different fitoceneses within the frigana types the geofit herbs as *Gladiolus atroviolaceus* Boiss., *Tulipa biflora* Pall., *İxiolirion tataricum* (Pal.) Herb. (*İ. montanum* (Labill.) Herb., *Allium rubellum* Bieb., *A. akaka* S. G. Gmel. ex Schult. & Schult fil. aggr., *İris caucasica* Stev., *İris pseudocaucasica* Grossh., *Muscari caucasicum* (Griseb.) Baker, *Bellevalia pycnantha* (C. Koch). Lozinsk., *İris lycotis* Woronow, *Leontice minor Boiss.*, *Biebersteinia multifida* D. C., and others have great roles. Altitude zones cover the mountainous areas of the south-west of the Zengezur range and the south-east of the Dereleyez range.

Highland, subalpine and alpine meadows have spread as a narrow strip in the 2300-2800 m. altitude of the NAR. This strip stretches beginning from Kukuchay basin to Alinjachay basin, cut in the river valleys and appear again in the dells. Tipical subalpine meadows that have formed in the highland-meadow solis, have spread in the northern and northern-eastern and northern-western slopes of the high mountains. Subalpine meadows of the region are known by very different formations and assosiations that differ by their specific features. L.İ. Prilipko differs the subalpine meadows of this zone into 2 parts: the humid mezofil meadows mixed with the forest-meadow elements and subalpine meadows. [Prilipko, 1939] [8]. In very sloping slopes the subalpine meadows are of dry, in flat soils and a bit slopping areas they are of mezofil composition.

At the result of the geobotanical investigations we could determine the geofit subalpine, mezofil subalpine, criophil subalpine and subalpine meadows. [Ibrahimov ASh., Salayeva Z.K., 1998]. Some of the *Hyacinthaceae* Batsch. species have spread in the floral biodifference of the region, in the subalpine meadows, in the grassy subalpine highlands, in the dry grainy subalpine meadows and in the subalpine zones. Mezofil subalpine meadows have spread in 2300-2800 m. altitude, in Kukudagh, Soyugdagh, Shikhyurdu, Batabat, Salvarti and other areas and form stripes that are clearly seen in the upper highlands. The herbal formations that are met in the highland zones sometimes resemble a field and sometimes they reszemble a meadow according to their species composition and characteristics of the assosiation. Thanks to the abundance of the geophits in such kind of meadows the projective coverage reaches to 60-70%.The productivity and forage value of these meadows are very poor till late May. But beginning with early summer the superiority of the parennial herbs causes increasing the productivity and forage value. Here the valuable forage herbs, grains, different grass are especially very much. During the draught the altitude mountain meadows complete the vegetation period very early. Dry and hot climate influence very badly not only to the mountaim phitoceneses but also to the subalpine meadows. In this zone we can meet mostly *Prata alliosa* and *Prata fridosa* meadows.

The *Prata alliosa* medows mostly consist of mezofil species and rearly they consist of higromesofil species. But *Prata fridosa* meadows cosist of halomesofil and cseromesofil species. In these subalpine meadows the *Hyacinthaceae* Batsch. species: *Muscareta, Allieta, İrieta, Gladiolueta, Bellevalieta* formations and its compositions as *Bellevalieta pycnanthae, Muscareta caucasicumae, Allieta akakae, İrieta imbricatae, Gladiolueta atroviolaceusae, Bellevalieta ornithogalosum, Gladiolueta herbosum, Muscareta scilleto-herbosum, İrieta gageto-herbosum, Allieta poeto- herbosum and others make* formations and assosiations.

During the investigations, in the subalpine zones of the NAR-Buzgov (2475 m), Kechaltapa (2744 m), Geydagh (2740 m), Kechaldagh (3118 m),Uchugdagh (2543m), Garagush (2700 m) mountains the following *Hyacinthaceae* Batsch. species as *Ornithagalum brachystachys* C. Koch, *O. arcuatum* Stev. Aggr., *O.sigmoideum* Freyn & Sint., *Puschkinia scilloides* Adams, *Muscari. tenuflorum* Tausch., *Muscari caucasicum* (Griseb.) Baker, *Muscari szovitsianum* Baker have been discovered by the investigators.

At the result of the investigations we have determined that by the influence of the ecological factors in the NAR territory the *Hyacinthaceae* Batsch. species have not spread in the same degree in the altitude zones. The eco-phitocenotical conformity to natural laws of these herbs causes different style spreading in dufferent altitude zones.

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