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Analysis endemics of the Nakhchivan Autonomous Republic of Azerbaijan

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Abstract
For the first time, we have made a list consisting of 3013 species of Nakhchivan flora and gave the systematic, bio-morphological, ecological and geographical analyses of flora. In the territory of Nakhchivan AR there are 112 species of Azerbaijan and 219 the Caucasus endemics. 199 species (105 – Caucasus, 94 - Azerbaijan) must be removed, because they are in the territory of Iran, Turkey and Armenia.

Keywords: vegetation, flora, genus, species, endemic, analysis

1. Introduction

A separate, physically isolated, area of land- the Autonomous Republic of Nakhchivan Is situated in the southwest of the Lesser Caucasus, in a typical mountainous. It has borders with Iran (163 km, some of which lies along the Araz River), Turkey (11 km) and Armenia (224 km). Nakhchivan covers some 5,362 km^2 and at its widest the territory stretches 158 km (from northeast to south-west).

The highest point in Nakhichevan Autonomous Republicis Gapijig mountain (3,906 m). Other mportant mountain rangesinclude the Zangazur and Daralayaz ranges in the northeast of the region, where there are a rıumber ofpeaks over 3,000 m. A third of the territory of Nakhchivan is covered by grassland/steppe, totaling some 172 km^2, of which some 10,000 ha is salinated.

Within the Nakhchivan Autonomous Republic there are around 400 water bodies, all associated with the Araz basin. The larger rivers in the territory are the Araz, Shargi Arpachay, Nakhchivanchay and Gilanchay. The area supports a number of natural lakes (including Batabat, Ganligol, Goy gol, and Salvarti gol) as well as reservoirs (including the Araz reservoir). The area also supported a number of kahrizes (systems of subterranean irrigation canals), although the number has declined significantly from 400 to around 182, and there is a danger that further springs will be lost.

The Autonomous republic Nakhchivan has particularly continental climate, with over 2800 hours of sunshine annually recorded in the Araz steppes. Rainfall in Nakhchivan varies between 200 and 600 mm, with low humidity throughout. Minimum and maximum recorded temperatures in the region are -30^{0}C and +40^{0}C respectively. The area is characterized by hot dry winds, which blow 50-70 days of the year (above 1,000 m) [10].

Experimental Part

The Autonomous Republic of Nakhchivan is an important centre of plant endemism and supports over 50% of the endemic plants found in Azerbaijan. Endemism is particularly high within a number of botanical families, including legumes and peas, roses and wild cherries, asters and wormwoods and grasses (endemism is high in *Fabaceae, Rosaceae, Asteraceae* and *Poaceae*). Recent re-evaluation suggests the territory has 112 country endemics, and 219 regional (Caucasian) endemics, and an additional (331) 73 plants are locally distributed within Iran and Turkey. Approximately 65 endemic species and sub-species are found only in Nakhchivan, including *Scrophularia nachiczevanica, Stipa isajevi, S.karjaginii* and *Pyrethrum ordubadica* [2, p. 55-56; 4, p. 15; 5, 6, p. 54-62].

Out of the 25000 accession, which are collected during exploration, have been established “Herbaria fund” in the Nakhchivan on the bases of own collection. Second “Herbaria fund” was established in the “Bioecology laboratory “at the GRI. For the present there are 2800 herbaria’s in this fund.

For the first time, have been study agrophytocenois together with the natural vegetative cover. In the structure of vegetative cover have been studied that there are 3013 plant species, which

consists of 5 sectors, 61 rows, 4 classes, 6 subclasses, 177 families and 914 genera. This is forming 66,69% of Azerbaijan flora and 43% of Caucasus flora. For the first time 24 families, 115 genuses, 222 species, 1 subclass, 1 row have been added to the Nakhchivan flora. From them 3 species are Azerbaijan, 17 species are Caucasus endemics. 3 species are new for Azerbaijan flora, 8 species are new for Caucasus flora. For Nakhchivan flora and gave the systematic, bio-morphological, ecological and geographical analyses of flora. According to the vital forms there are 86 (2,85%) species of trees, 251 (8,34%) shrubs, 1806 (59,94 %) half-shrubs, 870 (28,87 %) perennial, annual, biennial and species of annual-biennial grass crops. For the first time, have been study grass crops. For the first time, have been study agrophytocenoses together with the natural vegetative cover [7, 8, 9, 10, p. 130-135].

For the first time, we have made a list consisting of 3013 species of Nakhchivan flora and gave the systematic, bio-morphological, ecological and geographical analyses of flora [3]. In the territory of Nakhchivan AR there are 112 species of Azerbaijan endemics and 219 are the Caucasian endemics. 199 species (105 Caucasus and 94 Azerbaijan endemics) must be discarded, because they are in the territory of Iran, Turkey and Armenia. New matematical formules are given to cover project and productivity of phytosenoz. 1650 dominant, subdominant and identificator plant species have been identifid for fuld plant. Development plant dynamity,changes and seed productivity of phytosenoz.

For the first time, it was identified the spreading region of the 326 plant species and the geographical areal types. They are belonging to 12 classes of the 7 geographical areal types. In accordance with the international phytosenologacal code on the basis of dominant-determinant principles we gave the complete classification of vegetation. In the territory of Nakhchivan rocky, pseudomakkus, steppe, desert, semi-desert, forests, frigans, meadows, water-bogs (17 vegetation types) and gammadus are widely spread. The full classification of steppe vegetation and analytical map of Azerbaijan steppe vegetation were compiled. Under classify 17 type, 16 subtypes, 4 phytocoenosis types, 21 classes formation, 310 group formation, 13 subgroup formation, 430 formation, 1700 association were advanced. To be guided by the many year′s results of the exploration, have been sparated 7 altitude zones, 4 botanical-geographical regions, 15 flora regions and 62 geobotanical regions. We determined the continuation and course of successions taking place in them and the classification of each vegetation type is given in the level of formation and association. Have been found in tens new plant groupings, phytocoenosis [1, p. 68-72].

The existences of the birch and birch wood in the history of the Nakhchivan Autonomous Republic (NAR) have been confirmed by our exploration. In 2001 have been found its new areals (Bilev, Paragha, Behrud, Soyuqdagh), and oak wood, which is area is 350-400 hectare, in the territory of the Ordubad region in the Kilit village. It is called Pah-Qalaba forest, Sefil forest and Shefa Menzili forest. It was proved by theoretical and practical, that the districts of NAR are not determined correctly during the divisibility of the Caucasus region to the botanical-geographical provinces. For the some floristic and phytocenological characteristics Sherur-Derelyez, the south-west part of Iran and Armenia should be concern to the Nakhchivan botanical region. From this view point, this division in the years of 1909 and 1927 couldn't consider correctly, and it is expedient new division.

We had applied new mathematical formula for the study of the project cover phytocoenosis and related to them learning its productivity and we concerned these results to the analogical areas. The vegetation types of qammada, efemer-qalyant, and others for Nakhchivan territories have been found for the first time and its morphological, ecological, phytosenological and physiognomical characteristics are determined.

Table 1: The information on existing situation of endemic plant species in Nakhchivan AR flora

Latin and Azerbaijan name of the plant	Endemic			In the neigh bouring regions
	Caucasus	Azerbaijan	Only in Nakhchivan AR	
Allium dictyoprasum C.A.Mey.ex Kunth.	+			
A.affine Ledeb. (*A. transcaucasium* Grossh.)	+			
A. pseudoampeloprasum Miscz. ex Grossh.	+			
A.leucanthum C. Koch	+			
A.mariae Bordz.		+	+	
A.woronowii Miscz.ex Grossh.		+	+	
A.leonidii Grossh.		+	+	
A.kunthianum Vved.	+			+
A.syntamanthum C.Koch	+			+
A.materculae Bordz.		+		+
A.viride Grossh.	+			+
Alchimilla sedelmeyeriana Juz.	+			+
A. amicta Juz.		+	+	
A. grossheimii Juz.	+			
A.ortotricha Juz.	+			
A. epipsila Juz.	+			
A.smirnovii Juz.	+			
Aethionema diastrophis Bunge	+			
Anabsis eugeniae Iljin	+			
Anabasis eugeniae Iljin		+	+	
Asparagus persicus Baker	+			
Aconitum nasutum Fisch.ex Reichenb.	+			
Atropatenia rostrata (N.Busch.) F.K.Mey.		+	+	
Arabis carduchorum Boiss.	+			
Amyqdalus natrica Fed. et Takht.	+			

Androsace kozo-poljanskii Ovcz	+			
A. raddeana Somm.et Levier	+			
A.lehmanniana Sprenq.	+			
Arctium transcaucasium Sosn.	+			
Astragulus cancellatus Bunge	+			+
Astraqulus szovitsii Fisch.		+		+
A.shelkovnikovii Grossh.		+		+
A. conspicus Boriss.	+			+
A. aznabjurticus Grossh.		+	+	
A. schachbuzensis Rzazade		+	+	
A. nachitschevanicus Rzazade		+	+	
A.euoplus Trautv.	+			
A.insidiosus Boriss.		+	+	
A.badamlensis Chalilov		+	+	
Astraqulus karakuschensis Gontsch.		+	+	
A. regelii Trautv.		+	+	
A. gezeldarensis Grossh.	+			
A. kochianus Sosn.	+			
A. hajastanus Grossh.	+			
A. goktschaicus Grossh.	+			
A. chalilovii Grossh. et Fed.		+	+	
A. ordubadensis Grossh.	+		+	
A.prilipkoaunus Grossh.	+		+	
A.achundovii Grossh.ex Fed.		+	+	
A.erivanensis Bornm.et Woronow	+			
A.montis-aqulis Grossh.		+	+	
A.johannis Rzazade		+		+
Astracantha barba-carpinus Podlech		+	+	
A.vedicus (Takht.) Czer.	+			
A.jucundus (AI.Theod.,Fed.et Rzazade) Podlech		+	+	
A.gudrathi (AI.Theod.,Fed.et Rzazade) Podlech	+		+	
A.flavirubens (AI.Theod., Rzazade) Podlech	+			
Alyssum stapffii Vierh. (*A,buschianum* Grossh.)		+	+	
Aphanopleura trachysperma Boiss.	+			
Bellevalia longistila (Miscz.) Grossh.		+	+	
B.pycantha (C.Koch) Losinsk	+			
B. zygomorpha Woronow.		+		
Bromus tzvelevii Musayev et Sadichov		+	+	
Camelina sativa (L.) Grantz.	+			
Carlina acaulis L.	+			
Cymatocarrus grossheimii N Busch.		+	+	
Cirsium tricholoma Fisch. ex C. A. Mey.		+		+
C,sinuatum(Trautv.) Boiss.	+			+
C.megricum Charadze	+			
C.schelkownikowii Petrak.	+			
Carum caucasicum (Bieb.) Boiss.	+			+
Crataegus caucasica C. Koch.	+			+
C. armena Pojark.	+			
C.cynovskisii Kassumova		+	+	
Colutea komarovii Takht.		+	+	
Cephalaria nachiczevanica Grossh.		+	+	
C.armeniaca Bordz.	+			
Cephalorrynchus kirpicznikovii Grossh.		+	+	
Campanula karakuschensis Grossh.		+	+	
C.bayerniana Rupr.(C.elegantissima Grossh.)	+			
C.daralaghezica (Grossh.) Kolak.et Serdjukova	+			+
C.zangezura (Lipskyi) Kolak et Serdjukova	+			+
C.trautvetteri Grossh. ex Fed.	+			
Chamerion transcaucasicum Manden	+			
Ch.caucasicum (Willd.) Boiss.	+			
Chamaemelum nobile (L.) All.	+			
Colchicum szovitsii Fisch. et C. A. Mey.	+			
C.zangezurum Grossh.	+			
Celtis caucasica Willd.	+			+
Carduus seminudus Bieb.	+			
Cousinia lomkinii C. Winkl.	+			
Centaurea fischeri Schlecht		+	+	
Coteneaster saxatilis Pojark		+	+	
Crepis karakuschensis Czer.		+	+	

Draba bruniifolia Stev.	+			
D.bryoides DC.	+			
D.siliguosa Bieb.	+			+
Dianthus raddeanus Vierh.	+			+
D. subulosus Freyn et Conrath	+			
Delphinium foetidium Lomak.	+			
D.flexuosum Bieb.	+			
D.buschianum Grossh.	+			
D. caucasicum C.A. Mey.	+			
D.lomakinii Kem.-Nath.		+	+	
Doronicum macrophyllus Fisch.ex Hornem.	+			
D.oblongifolium DC.	+			
Dorema glabrum Fisch. et C.A.Mey.		+	+	
Dracocephalum botryoides Stev.	+			+
D.multicaule Montbr.	+			+
Echinops orientalis Trautv. (*E.arachinus* Mulk.)	+			+
E.polygamus Bunge (*E.grossheimii* Iljin)	+			
Elytriqia heydemaniae Tzvel.		+	+	
Eurhrasia georgica Kem.-Nath.	+			
E.caucasica Juz.	+			
Euphorbia leucographus Bunge	+			
E.marschalliana Boiss.	+			+
E.nutans Lag.				
E. grossheimii Prokh		+	+	
Eryngium wanaturi Woronow	+			
Erysimum chazarjurti N.Busch.	+			
E.lilacinum Steinb.	+			
E.leptophyllum (BIeb.) Andrz.		+	+	
E.buschii M.Kassumov		+	+	
E.subulatum J. Gay.(*E. iljinii* M.Kassumov)		+	+	
E.crassipes Fisch.et C.A.Mey	+		+	
E.wagifii M.Kassumov		+	+	
E.nachiczevanicum M.Kassumov		+	+	
Fritillaria caucasica Adams	+			+
Fuernrohria setifolia C.Koch.	+			
Ferula oopoda (Boiss. et Buhse) Boiss.		+	+	
Gagea alexeenkoana Miscz.	+			+
G.caroli-kochii Grossh.	+			+
G.improvisa Grossh.		+	+	
Galium czerepanovii Pobed.		+	+	
G.consanguineum Boiss.	+			
G.achurense Grossh.		+	+	
G.atropatanum Grossh.		+	+	
G.bulbatum Lipsky		+	+	
G.hyrcanum C.A.Mey. (*G.grossheimii* Pobed.)		+	+	
Gypsophila szovitsii Fisch.et C.A.Mey. ex Fenzl.	+			+
G.stevenii Fisch.ex Schrank	+			
G.lipsky Schischk.	+			
Dianthus caucasicus Smith. (*G.discolor* Smith.)	+			
D.raddeanus Vierh.	+			
D.subulosus Freun et Conrath.	+			
Hylotelephium caucasicum H. Ohba.	+			
Hypericum formosissimum Takht.		+	+	
H.atropatanum Rzazade			+	
H.helianthomoides (Spach) Boiss.	+		+	
Haplophyllum villosum (Bieb.) G.Don fil.	+			+
H.schelkovnikovii Grossh.		+	+	+
Hedysarum ibericum Bieb.	+			+
H.cericeum Bieb.	+			+
H.caucasicum Bieb.	+			
Helichrisum araxinum Takht.et Kirp.		+	+	+
Hieracium cincinnatum Fries.	+			
H.perileucum (Schischk. et Zahn.) Juxip.	+			
H.akinfiewii Woronow et zahn.	+			
Heracleum pastinacifolium C.Koch.	+			+
H.schelkownikovii Woronow	+			
Iris spuria subsp. *I.musulmanica* Fomin	+			+
I.paradoxa Stev.	+			+
I.iberica Hoffm.	+			+

I.prilipkoana Kem.- Nat.	+			
I.grossheimii Woronow ex Grossh.		+	+	
I.limbata Lindl. (*I.sulphurea* C.Koch.)	+			
I. lycotis Woronow		+	+	
Irydodictyum hyrcanum Rodionenko		+		
Juno schischkini (Grossh.) Czer.		+	+	
I.caucasica(Hoffm) Klatt.	+			
I.pseudocaucasica (Grossh.)	+			+
Inula mariae Bordz.	+			
Jurinea spectabilis Fisch.et C.A.Mey.	+			
Lathyrus rotundifolius Willd.	+			+
L.atropatanus (Grossh.) Sirj		+	+	
Lactuca georgica Grossh.	+			
Lotus caucasicus Kuprian.ex Juz	+			
Limonium fischeri (Trautv.) Lincz.		+	+	
Linum subbiflorum Juz.		+	+	
L.hypericifolium Salisb.		+	+	
Linaria zangezura Groosh.	+			
L.megrica Tzvel. (*L.ordubadica* Tzvel.)	+			
L.schelkownikowii Schischk.	+			
Cardaria propingua Fisch. et C.A.Mey.	+			
Medicago caucasica Vass.	+			+
Melica schischkinii Iljinsk.		+	+	
Milium transcaucasium Tzvel.		+	+	
Muscari leicostomum Woronow ex Gzerniak		+		
Malabaila sulcata Boiss.	+			
Marrubium nanum Knorr.		+	+	
Melampurum chlorostachyum Beauverd	+			
M.caucasicum Bunge.	+			
Melilotoides biflora (Griseb.) Czer				
Nepeta stricitifolia Pojark		+	+	
N.zangezura Groosh.	+			+
N.mussinii Spreng. (*N. transcaucasica* Grossh.)	+			
N.noraschenica Grossh .		+	+	
N.trautvetteri Boiss.et Buhse (*N.velutina* Pojark)	+			
N.schischkinii Pojark.		+		+
N.betonicifolia C.A.Mey.		+		+
N.erivanensis Pojark.	+			
Neurotropis armena (N.Busch) Czer.		+	+	
N.szovitsiana (Boiss.) C.A.Mey		+	+	
Noccaea tatianae (Bordz.) F.K.Mey	+		+	
Nonnea rosea (Bieb.) Link.	+			+
Onobrychis transcaucasica Grossh.	+			+
O.hajastana Groosh.	+			+
O.heteropylla C.A. Mey.	+			+
O.radiata (Desf.) Bieb.	+			
O.cyri Grossh	+			
Orobanche raddeana G.Besk	+			+
Ornithogalum brachystachys C.Koch.	+			+
O.schelcovnikovii Groossh	+			
O.balansae Boiss.(*Schmalhausenii* Albov)	+			+
O.trancaucasicum Miscz. ex Grossh.	+			
Oxytropis karjaginii Grossh.	+			+
O.lupinoides Groosh.ex Fed.		+	+	
Onosma gracilis Trautv	+			
Pimpinella aromatica Bieb.		+		
Populus canascens (Ait.) Smith (*P.hibrida* Bieb.)	+			
P.sosnovskyi Grossh.	+			
P.gracilis Grossh.	+			
Pyrus zangezura Maleev	+			
P.voronovii Rubtz.	+			
P.nutans Rubtz.	+			
P.medvedevii Rubtz.	+			
P.raddeana Woronow	+			
Potentilla lomakinii Lomakini	+			
P.conferta Bunge (*P.agrimonioides* Bieb.)	+			+
P.szovitsii Th.Wolf	+			+
Pyrethrum ordubadense Manden		+	+	
P.komarovii Sosn.		+	+	

P.punctatum (Desr.) Bordz. ex Schischk.	+			
Polygala hohenaskeriana Fisch. et C.A. Mey.	+			+
Polygonum bellardii All. (*P.tiflisensis* Kom.)	+			
Peducularis crassirostris Bunge.	+			
Peltariopsis grossheimii N.Busch.		+	+	
Ribes biebersteinii Berl.ex DC.		+		
Rubus ibericus Juz.	+			
Rosa tuschetica Boiss.	+			
R.nizami Sosn.		+	+	
R.sachokiana P.Jarosch.	+			
R.karjaginii Sosn.		+	+	
R.marschalliana Sosn.	+			
R.zangezura P.Jarosch	+			
R.sosnovskyana Tamamsch.	+			
R.kazarjanii Sosn.	+			
R.hracziana Tamamsch.	+			
R.sosnovskiana Chrshan.	+			
R.brotherorum Chrshan.	+			
R.pulvurulenta Bieb		+	+	
R.buschiana Chrshan.	+			
R.orientalis Duront ex Ser	+			
Ranunculus grandiflorus L. (*R.elegans* C.Koch)	+			
Rhynchocorys orientalis (L) Benth.	+			
Salsola cana C.Koch	+			
S.futilis Iljin		+	+	
S.tomentosa (Mog.) Spach,		+	+	
S.nitraria Pall. (*S.macera* Litv.)	+			
S.tamamschjanae Iljin	+			+
S.dzulphensis Grossh.		+	+	
S.nodulosa (Mog.) Iljin	+			+
Salvia pachystachya Trautv.	+			+
S.limbata C.A. Mey.	+			+
S.suffruticosa Montbr.et Auch, ex Benth		+	+	
S.reuteriana Boiss. (*S.nachiczeanica* Pobed.)		+	+	
S.andreji Pobed.		+	+	
Scilla mischtchenkoana Grossh.		+	+	
S.sibirica Haw.	+			
S.armena Grossh.	+			
Scorzonera czerepanovii R.Ram.	+			+
Scrophularia atropatana Groosh.		+	+	+
S.nachitschevanica Grossh.		+	+	
S.cinerascens Boiss. (*S.grossheimii* Schischk.)	+			
S.thesoides Boiss.et Buhse.		+	+	
S.variegata Bieb.	+			+
Sedum corymbosum Grossh.	+			+
Silene prilipcoana Schischk.		+	+	+
S.depressa Bieb.	+			
S.caucasica (Bunge) Boiss.	+			
S.tatjanae Schischk.	+			
S.longipetala Vent. (*S.chloropetala* Rupr.)	+			
S.iberica Bierb.	+			
Smyrniopsis aucheri Boiss.	+			+
Swertia iberica Fisch.et C.A. Mey.	+			
Stachys fruticulosa Bieb. (*S.grossheimii* Kapell.)		+	+	
S.intlata Benth.		+		
S.fomini Sosn.		+	+	
Symphytum asperum Lepech.	+			+
S.caucasicum Bieb.	+			
Sameraria glastifolia (Fisch. et C.A,Mey.) Boiss.		+	+	
Senecio lipsky Lomak.	+			
Stenotaenia macrocarpa Freyn et Sinth.		+	+	
Stipa issaevii Musayev et Sadychov		+	+	
S.karjaginii Musayev et Sadychov		+	+	
S.gaubae Bor.		+	+	
S.holosericea Trin.et Rupr.	+			
Salix aegyptiaca L. (*Phlomoides* Bieb.)	+			
Seseli grandivittatum Schischk.	+			
Scutellaria karjaginii Grossh.		+	+	
S.rhomboidalis Grossh.		+	+	

S.darriensis Grossh.		+	+	
S.sevanensis Sosn.et Grossh.	+			
Saxifraqa pontica Albov	+			
S.juniperifolia Adams	+			
Solidago armena Kem-Nath.ex Grossh.	+			
Serratula haussknechtii Boiss.	+			
S.serratuloides (Fich. et C.A.Mey.) Takth.	+			
Stizolophus balsamita (Lam.) Cass.ex Takht.	+			
Thesium szovitsii A.DC.	+			+
Thymus migricus Klok. et Shost.	+			+
Th.nummularies Bieb.	+			+
Th.collinus Bieb.	+			
Tragopogon marginatus Boiss.	+			+
T.nachitschevanicus (Kunth) N.Pop.		+	+	
T.sosnowskyi Kuth.	+			
Taraxacum desertorum Schischk.		+	+	
T.prilipkoi Czer. (*T.praticola* Schischk.)	+			
Tomanthea daralaghezica (Fomin) Takht.	+			
Trinia leiogona (C.A.Mey.) B.Fedtsch.	+			+
*Tulira eichleri R*egel		+		
Trifolium fontanum Bobr.				
Vicia anatolica Turrill. (*V.hajastana* Grossh.)	+			+
V.ciceroidea Boiss. (*V. rafigae* Tamamsch.)	+			+
V.grossheimii Ekvtim	+			
Vavilovia formosa (Stev.) Fed.		+	+	
Verbascum erivanicum E.Wulf		+	+	
V.georgicum Benth.	+			
V.paniculatum E.Wulf		+	+	
Zeravschanica pauciradiata M.Pimen		+	+	
Zizirhora denticulate Juz.	+			

The main vegetation groups have been established, their geobotanical and economic features are determined, the genesis of flora and vegetation is defined more exactly, rare exhausting, endemic and relict species are discovered and we have given the ways of their protection and scientific basis of their introduction.

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