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Botanical tour of Armenia in summer (July 2019)



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Résumé :
Ce compte-rendu présente le résultat d'une mission botanique réalisée en Arménie en période estivale. La végétation et les cortèges floristiques sont présentés par étage de végétation, cette zone géographique étant caractérisée par un relief très marqué. Ce hotspot floristique se trouve au croisement des influences de la mer Noire et de la mer Caspienne avec pas moins de quatre types géomorphologiques différents, favorisant ainsi une forte biodiversité.



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Introduction

The Caucasus is one of the most biologically rich regions on Earth. This hotspot, historically interpreted as the isthmus between the Black and Caspian seas, covers a total area of 580,000 km^2, including the nations of Armenia, Azerbaijan and Georgia, the North Caucasus portion of the Russian Federation, northeastern Turkey and part of northwestern Iran (WILLIAMS, 2003). The Caucasus isthmus forms part of the huge mountain belt, the Alpine Orogene, which embraces the whole of Eurasia from the Pyrenees and Atlas Mountains in the west to the Malay Peninsula and Vietnam in the east. These include the North Caucasian Plain (the eastern part of which is below sea level), the Great Caucasus Range (with Mt. Elbrus as the highest peak at 5,642 m), the Transcaucasian (South Caucasian) Depression, the Small Caucasus mountain chain (to 3,500 m), and Transcaucasian Uplands (with Mt. Ararat as the highest point at 5,165 m) (ZANANASHVILI *et al.*, 2000). This account presents the results of a botanical trip which took place in the central and northern part of Armenia. This country which is part of the Minor Caucasus (Transcaucasus) lies at an altitude ranging from 375 to 4,095 m above sea level. Four main geomorphological regions can be recognised within Armenia (FAYVUSH & ALEKSANYAN, 2016):

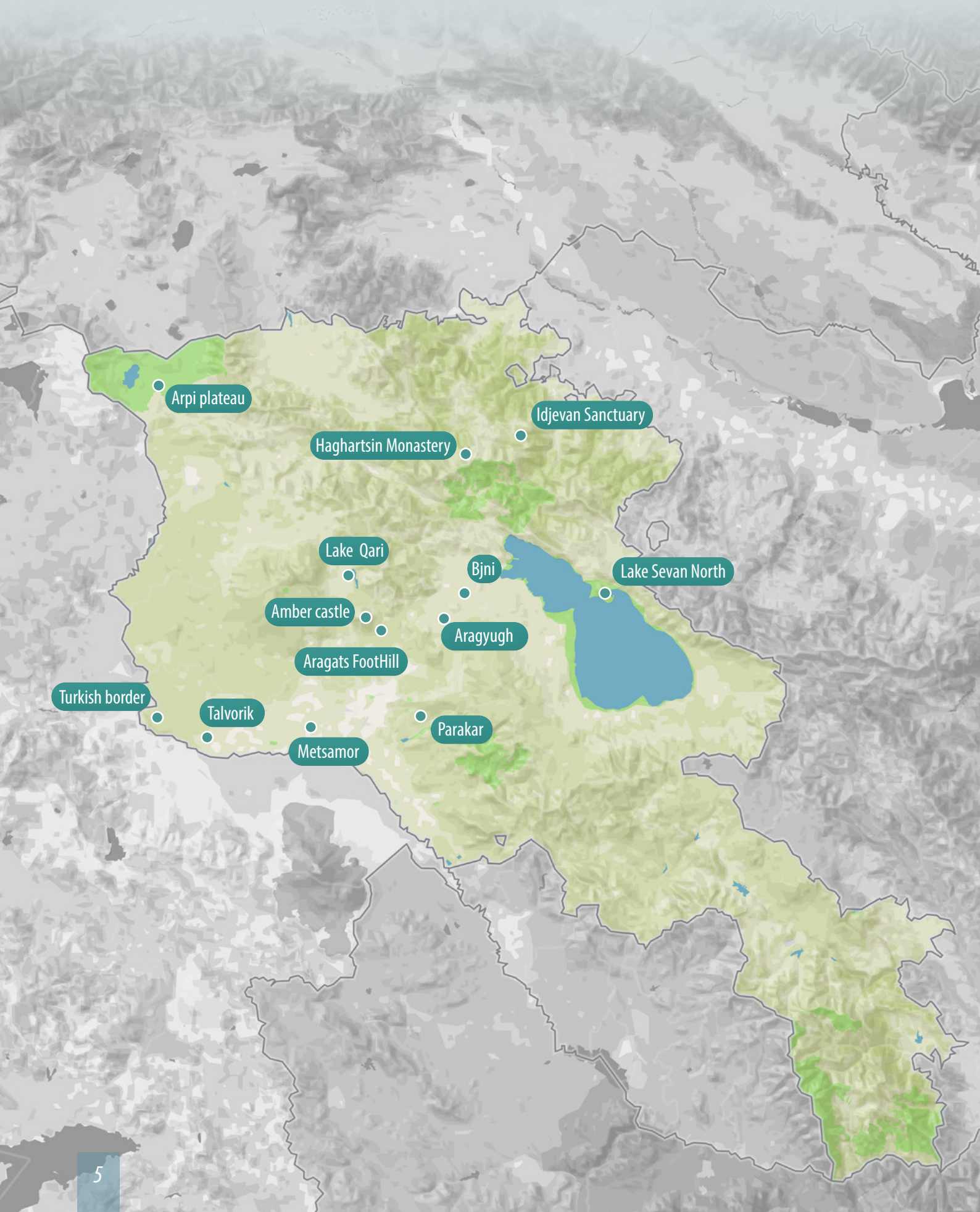
- Mountain ridges and valleys in the north–east
- Areas covered by lava
- Ridged mountains in the south
- The Ararat Valley covered with alluvial and proluvial sediments

Almost all main types of vegetation in the Caucasus (excluding flora of wet subtropics) are present in Armenia (GABRIELIAN, 1981; FAYVUSH *et al.*, 2013; VARDANYAN, 2014). There are 29 Important Plant Areas in this country and about 3,800 species of vascular plants, including 142 endemic species, are registered on a territory of 29,740 km^2. This represents more than half the flora of the Caucasus (about 6,000 species) (KHANJYAN, 2004). Furthermore, the Armenian Highland is one of the centres of origin of cultivated plants. The landscape of Armenia is a complex combination of folded and volcanic mountains, alluvial plains, highlands lava plateaus, narrow river valleys and lake basins. The variety of the plants is also influenced from the North by the Caucasian mesophilic flora, and from the South by more arid flora of Mediterranean area and Armeno-Iranian floristic province (GABRIELIAN *et al.*, 2016).
This botanical trip took place from 7 to 11 July 2019.
For identification issues, we used TAKHTAYAN (1954-2010), KOMAROV *et al.* (1934-1960) and TUTIN *et al.* (1964-1980) floras. The nomenclature of taxa follows that of the website «www.plantarium.ru».
MAGAKYAN (1941) analysed in detail the vegetation of Armenia. Later ZAZANASHVILI *et al.* (2000) proposed a terminology describing each zonation type and subtype to be found in the country. This is the model this report will follow to present the results of this botanical trip.

All photos are courtesy of M.-A. Bouchet except when mentioned.



The tour itinerary below covered all the locations presented in this report. Geographic coordinates of the locations are displayed in appendix 2.



Semi-shrub zone (shibliak) with scattered shrubs of *Rhamnus pallasii*

Detailed report



South Caucasian type: xeric grass and semi-shrub zone

This zone stands between 800 and 1,600 m high and is composed of shrubs and steppe communities. We first stopped in Parakar, in the Armavir Marz (local term for province), west of Yerevan. One of the first species we recorded was a plant very famous in Armenia and used for medical purposes and for fodder, Alhagi (Alhagi maurorum) showing its red flowers. Some more species also occurred in the vicinity:

- *Acroptilon repens*
- *Alhagi maurorum*
- *Cynanchicum acutum*
- *Glycyrrhiza glabra*
- *Peganum harmala*
- *Sisymbrium loeselii*
- *Tribulus terrestris*
- *Zygophyllum fabago*



Alhagi maurorum



Acroptilon repens

Further west, we arrived near a small town called Metsamor. The landscape is a mix of cultivated areas and open xeric more or less grazed shrublands. The vegetation was dominated by the following species:

- *Achillea arabica*
- *Althaea cannabina*
- *Cuscuta campestris*
- *Sophora alopecuroides*





Sophora alopecuroides with flowers and fruits

Heading to the Turkish border, another stop makes us discover more species growing in steppic areas:

- *Cynanchicum acutum*
- *Lepidium draba*
- *Lepidium perfoliatum*
- *Lepidium vesicarium*
- *Noaea mucronata*
- *Peganum harmala*
- *Polygonum pulchellum*
- *Zygophyllum fabago*

The last stop before the border was worth discovering more typical steppic species forming a vegetation type called shibliak (BATSATSASHVILI *et al.*, 2020):

- *Artemisia austriaca*
- *Atraphaxis spinosa*
- *Centaurea diffusa*
- *Ceratocephala falcata*
- *Cousinia macroptera*
- *Eremopyrum bonaepartis*
- *Euphorbia seguieriana*
- *Falcaria vulgaris*
- *Glaucium corniculatum*
- *Koelpinia linearis*
- *Leonurus cardiaca*
- *Phlomoides laciniata*
- *Rhamnus pallasii*
- *Taeniatherum sp.*
- *Teucrium polium*
- *Xeranthemum squarrosum*



Lepidium vesicarium with its typical inflated nodes



Rhamnus pallasii


Xeranthemum squarrosum


Atraphaxis spinosa

Along a stream, near an apricot orchard we recorded *Echium italicum* as well as some hygrophilous species:

- *Lythrum virgatum*
- *Mentha longifola*
- *Stachys palustris*


Eremopyrum bonaepartis


Lythrum virgatum

Our trip goes on to the North in the Kotayk Marz. There are cultivated areas surrounded by steppic vegetation. Between Zoravan and Aragyugh we recorded:

- *Allium atroviolaceum*
- *Artemisia armeniaca*
- *Astragalus lagopoides*
- *Astrodaucus orientalis*
- *Centaurea cyanus*
- *Centaurea diffusa*
- *Cephalaria syriaca*
- *Cichorium intybus*
- *Crepis pulchra*
- *Cuscuta approximata*
- *Delphinium orientale*
- *Dianthus crinitus*
- *Eryngium caeruleum*
- *Falcaria vulgaris*
- *Gypsophila bicolor*
- *Lathyrus tuberosus*
- *Orobanche lutea*
- *Phlomis pungens*
- *Potentilla recta*
- *Salvia aethiopis*
- *Sideritis montana*
- *Teucrium orientale*
- *Turgenia latifolia*
- *Vicia tenuifolia*



Gypsophila bicolor



Vicia tenuifolia



Astrodaucus orientalis



Astragalus lagopoides



Delphinium orientale



Dianthus crinitus



Cephalaria syriaca

Further north we entered Bjni locally known for having a nice monastery. In this area, the landscape is hillier: the vegetation is still steppic and there are less fields.

- *Aegilops cylindrica*
- *Astragalus falcatus*
- *Carduus nutans*
- *Centaurea iberica*
- *Centaurea solstitialis*
- *Descurainia sophia*
- *Euphorbia seguieriana*
- *Lappula squarrosa*
- *Leonurus cardiaca*
- *Malabaila dasyantha*
- *Onobrychis cornuta*
- *Ononis spinosa subsp. hircina*
- *Orobanche grenieri*
- *Phlomis pungens*
- *Piptatherum holciforme*
- *Pyrus elaeagnifolia*
- *Reichardia dichotoma*
- *Rumex scutatus*
- *Salvia aethiopis*
- *Salvia nemorosa*
- *Scariola viminea*
- *Sideritis montana*
- *Silene chlorifolia*
- *Teucrium montanum*
- *Ziziphora sp.*



Leonurus cardiaca



Bjni monastery



Astragalus falcatus



Orobanche grenieri



Piptatherum holciforme



Pyrus elaeagnifolia



Onobrychis cornuta



Descurainia sophia



Along the river Hrazdan we added some more species:

- *Bunias orientale*
- *Capsella bursa-pastoris*
- *Dipsacus pilosus*
- *Juncus compressus*
- *Matricaria discoidea*
- *Polygonum cognatum*
- *Potentilla anserina*
- *Veronica anagallis-aquatica*

Centaurea iberica

Foothill of Mount Aragats



South Caucasian type: Hemi-xeric woodland zone

This zone appears above 1,600 m above sea level and reaches 2,300 (2,400) m. It includes Caucasian Oak (*Quercus macranthera*) woodlands, low woodlands, hemi-xeric shrublands, thorn cushion communities and meadow steppes.

This is the kind of vegetation one could discover when approaching Mountain Aragats. It is in the western part of Armenia, between Ararat and Shirak valleys, Akhuryan and Kasagh rivers. We first stopped at the lower part of the mountainous area, above Antarut where we recorded many mid-montane plant species:



Helichrysum armenium



Quercus macranthera

- *Aconogonon alpinum*
- *Asyneuma sp.*
- *Centaurea polypodiifolia*
- *Chamaenerion angustifolium*
- *Cirsium ciliatum*
- *Cirsium echinus*
- *Crataegus orientalis*
- *Cuscuta europaea*
- *Cynoglossum officinale*
- *Daphne oleoides*
- *Delphinium schmelhausenii* (Caucasus end.)
- *Echium russicum*
- *Eremogone gypsophiloides*
- *Erodium absinthoides subsp. armenum*
- *Filipendula vulgaris*
- *Ferula rigidula*
- *Galium verum*
- *Inula oculus-christi*
- *Helianthemum ledifolium*
- *Helichrysum armenium*
- *Hordeum bulbosum*
- *Hypericum linarioides*
- *Juniperus hemisphaerica*
- *Lallemantia peltata*
- *Nepeta mussinii*
- *Nepeta nuda*
- *Onosma sericea*
- *Papaver bracteatum*
- *Phlomis pungens*
- *Polygonum alpestre*
- *Polygonum bellardii*
- *Quercus macranthera*
- *Ranunculus arvensis*
- *Salvia verticillata*
- *Scabiosa bipinnata*
- *Scabiosa micrantha*
- *Scutellaria orientalis*
- *Securigera varia*
- *Silene sisianica*
- *Stachys iberica*
- *Tanacetum balsamita*
- *Tanacetum canescens*
- *Teucrium chamaedrys*
- *Teucrium orientale*
- *Thalictrum minus*
- *Tomanthea spectabilis*
- *Trifolium canescens*



Centaurea polypodiifolia



Salvia verticillata



Nepeta nuda



Scabiosa micrantha



Delphinium schmelhausenii



Tomanthea spectabilis



Crataegus orientalis



Onosma sericea



Nepeta mussinii



Teucrium orientale


Cirsium ciliatum


Silene sisianica


Hypericum linarioides


Ferula rigidula

Another stop at Amber Castle, in the vicinity, is a good opportunity to discover a historic sight dominating the valley. Some interesting species were recorded:

- *Blitum virgatum*
- *Cephalaria gigantea* (end. Caucasus)
- *Nectaroscordum tripedale*
- *Prangos ferulacea*



Amberd castle, photo: J.-P. Brizard



Cephalaria gigantea, photo: J.-P. Brizard



Nectaroscordum tripedale, photo: H. Michaud

A visit to the Arpi Lich National Park is a good way to discover wet meadows with its hygrophilous vegetation. Lake Arpi is a natural wetland of botanical importance, although the water level has been raised by an artificial dam. It supports several plant species which are rare in Armenia. The lake is fed by several small rivers, springs and melt-water, and freezes over during the winter months.

- *Aconitum orientale*
- *Artemisia absinthium*
- *Artemisia armeniacum*
- *Beckmannia eruciformis*
- *Betonica macrantha*
- *Blitum virgatum*
- *Carex hartmanii*
- *Carex hirta*
- *Carex pallescens*
- *Deschampsia caespitosa*
- *Delphinium albiflorum/ochroleucum*
- *Filipendula ulmaria*
- *Filipendula vulgaris*
- *Galium verum*
- *Geum rivale*
- *Gymnadea conopsea*
- *Hordeum secalinum*
- *Jacobaea racemosa*
- *Juncus alpino-articulatus*
- *Juncus inflexus*
- *Lactuca tatarica*
- *Lathyrus pratensis*
- *Phleum pratense*
- *Picris hieracioides*
- *Rhinanthus minor*
- *Rosa spinosissima*
- *Rumex crispus*
- *Sanguisorba officinalis*
- *Stellaria persica* (end. Caucasus)
- *Tanacetum balsamita*
- *Trifolium alpestre*
- *Trifolium pannonicum*
- *Zingeria trichopoda*
- *Ziziphora sp.*





Blitum virgatum, photo: J.-P. Brizard



Meadows on Arpi plateau
photos: L. Teulade & J.-P. Brizard

Here are some species recorded along a stream:

- *Butomus umbellatus*
- *Catabrosa aquatica*
- *Glyceria sp.*
- *Lemna minor*
- *Parnassia palustris*
- *Phalaroides arundinacea*
- *Sparganium erectum*
- *Sparganium natans*
- *Zannichellia palustris*



Delphinium albiflorum/ochroleucum, photo: J.-P. Brizard



South Caucasian type: Alpine grassland zone

Back to Mount Aragats which is a regular cone with jagged summits and slightly oblique slopes. Aragats is the highest mountain of Armenia, reaching 4,095 m above sea level. Thus, it is the highest point in the Lesser Caucasus range. Its flora and vegetation are very rich. Several vegetation belts are distinguished from the foothill (VOSKANIAN, 1976). Now we are reaching the alpine belt starting at 2,600-2,700 m high. Here are some species to be discovered in this scenic area:

- *Ajuga orientalis*
- *Alopecurus glacialis*
- *Astragalus aureus*
- *Campanula aucheri*
- *Campanula stevenii*
- *Campanula tridentata*
- *Carex tristis*
- *Chamaesciadium acaule* (end. Caucasus)
- *Erigeron caucasicus* subsp. *venustus*
- *Gagea glacialis*
- *Gentiana verna* subsp. *pontica*
- *Hedysarum caucasicum*
- *Jurinella moschus*
- *Myosotis alpestris*
- *Pedicularis sibthorpii*
- *Primula auriculata*
- *Ranunculus aragazi*
- *Sedum tenellum*
- *Sibbaldia parviflora*

Lake Qari



Alopecurus glacialis



Carex tristis



Chamaesciadium acaule



Campanula stevenii



Sedum tenellum



Campanula aucheri



Campanula tridentata



Pedicularis sibthorpii



Ajuga orientalis



Astragalus aureus



East Caucasian type: Lower mountain belt

This belt occurs between 500 and 1,000 (1,200) m. It includes Georgian Oak (*Quercus macranthera*) forests and beech/hornbeam forests. The Idjevan Sanctuary is lying on a low mountain northwest of Idjevan. The landscape there includes meadows and forests with the following plant species:

- *Acer platanoides*
- *Alcea rugosa*
- *Artemisia annua*
- *Asplenium trichomanes*
- *Astragalus cicer*
- *Astragalus glycyphyllos*
- *Campanula alliariifolia*
- *Cannabis sativa*
- *Cardaria draba*
- *Circaea lutetiana*
- *Clinopodium vulgare*
- *Cornus mas*
- *Corylus avellana*
- *Daucus carota*
- *Euphorbia macroceras*
- *Festuca gigantea*
- *Fraxinus excelsior*
- *Hordelymus europaeus*
- *Inula helenium*
- *Lapsana grandiflora*
- *Lysimachia punctata*
- *Melissa officinalis*
- *Onopordum acanthium*
- *Ostrya carpinifolia*
- *Piptatherum virescens*
- *Poa annua*
- *Quercus iberica*
- *Salvia glutinosa*
- *Sambucus ebulus*
- *Scutellaria altissima*
- *Serratula tinctoria*
- *Stachys germanica*
- *Stachys sylvatica*
- *Tamus communis*
- *Xanthium spinosa*



Euphorbia macroceras

Quercus iberica



Astragalus cicer



Lysimachia punctata



Alcea rugosa



Inula oculus-christi



Scutellaria altissima

Harghartsin monastery surroundings, photo: J.P. Brizard



East Caucasian type: Mesic beech forest zone

We then headed to Haghartsin monastery which lies at a higher elevation corresponding to the next zonation type. This zone occurs from 1,000 to 1,800 (2,000) m. It can be divided in middle mountain belt (1,000 - 1,500 m) including *Fagus orientalis* and *Pinus kochiana* forests and upper mountain belt which includes *Fagus orientalis* forests, *Quercus macranthera* forests and *Pinus kochiana* woodlands. Most of the species recorded were forest species.

- *Agrimonia eupatoria*
- *Alcea rugosa*
- *Anthemis altissima*
- *Asplenium ruta-muraria*
- *Briza elatior*
- *Campanula alliariifolia*
- *Carpinus betulus*
- *Centaurea ossethica*
- *Cystopteris fragilis*
- *Dipsacus pilosus*
- *Euonymus europaeus*
- *Fagus orientalis*
- *Fragaria viridis*
- *Gentiana cruciata*
- *Geranium sanguineum*
- *Geum urbanum*
- *Helianthemum grandiflorum*
- *Hesperis matronalis*
- *Lathyrus miniatus*
- *Ligustrum vulgare*
- *Melampyrum chlorostachyum*
- *Mespilus germanica*
- *Oberna multifida*
- *Primula veris*
- *Pyrethrum parthenium*
- *Quercus iberica*
- *Rhynchocorys orientalis (end. Caucasus)*
- *Salvia glutinosa*
- *Securigera varia*
- *Symphytum asperum*
- *Torilis japonica*
- *Trifolium pratense*
- *Trifolium repens*
- *Valeriana tiliifolia*
- *Viburnum lantana*



Harghartsin monastery surroundings, photo: J.P. Brizard



Lathyrus miniatus



Symphytum asperum



Valeriana tiliifolia



Rhynchocorys orientalis, photo: J.-P. Brizard



Oberna multifida



Melampyrum chlorostachyum

Lake Sevan, photo: J.P. Brizard



East Caucasian type: Subalpine elfin wood and meadow zone

This zone is composed of the lower subalpine belt (1,900-2,200 m) and the upper subalpine zone (2,200-2,600 m). We only visited the first one including low juniper open communities and meadow steppes along Lake Sevan. This area is included in a national Park also encompassing adjacent grounds. It is one of the highest and biggest freshwater lakes in the world. Lake Sevan supposedly originated in the result of volcanic activity. Nowadays the lake is situated at the altitude of about 1,900 m and its surface reaches 1,250 km^2.
Here are the main species recorded.

- *Acantholimnon sp.*
- *Arceuthobium oxycedri*
- *Artemisia austriaca*
- *Asperula arvensis*
- *Berberis orientalis*
- *Bupleurum rotundifolium*
- *Chenopodium glaucum*
- *Cleome ornithopodioides*
- *Convolvulus lineatus*
- *Cuscuta approximata*
- *Ephedra procera*
- *Euphorbia seguieriana*
- *Galium verticillatum*
- *Lonicera iberica*
- *Medicago sativa*
- *Polygonum bellardii*
- *Rhamnus lycioides*
- *Sempervivum caucasicum*
- *Spiraea crenata*
- *Teucrium orientale*
- *Teucrium polium*
- *Xeranthemum squarrosum*



Lonicera iberica, photo: J.P. Brizard





Cleome ornithopodioides, photo: J.P. Brizard

Lake Sevan, photo: J.P. Brizard

Berberis orientalis, photo: J.P. Brizard

• Endemism

The Caucasus is a hotspot of plant and animal diversity and endemism. Located at a biological crossroads, species from Central and Northern Europe, Central Asia and the Middle East, and North Africa mingle with endemics found nowhere else. Over 6,500 species of vascular plants are found in the Caucasus. At least a quarter of the plants is found nowhere else on Earth – the highest level of endemism in the Temperate Zone of the Northern Hemisphere (WILLIAM et al., 2006).
A comprehensive list of Caucasian endemic plant species, subspecies and varieties, comprising 2,800 taxa, was compiled. Of these, 1,100 taxa were assessed according to the IUCN Red List categories and criteria, of which around 600 taxa (mostly ones with very restricted distributions) were assessed as globally threatened (ZANANASHVILI & MALLON, 2009).
The endemic flora of Armenia is of relatively recent origin (dating from the Quaternary or Holocene), with no ancient endemic species recorded (Ministry of Nature Protection, 1999). This reflects the relatively recent diversification of flora in the region, which has resulted in the current botanical richness of Armenia. The distribution of endemics corresponds closely with climate, and most are found in the southern and central arid zones of the country. In particular the regions of Daralagiaz and Yerevan show high numbers of endemics (with 38 and 36 species respectively).

Vegetation type	Altitude (m)	Number of species	Number of endemics
Semi-desert	400-1,250	1,400	16
Steppes and meadow-steppes	1,200-2,200	1,600	46
Open arid forests	600-2,200	900	35
Forests	550-2,400	870	23
Waterlands vegetation	400-3,800	630	3
Subalipne and alpine meadow	2,200-4,000	1100	24
Petrophilous vegetation	400-4,000	1100	27

Main features of Armenian different vegetation types (from VARDANYAN, 2014)

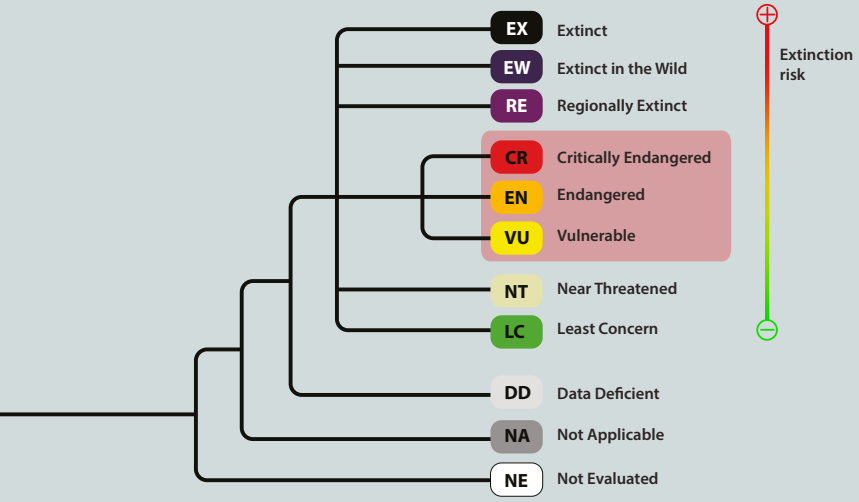
Thus, at present the flora of Armenia includes 144 endemic species (3.8% of total flora) (VARDANYAN, 2014).
During this trip three species endemic to Caucasus were recorded:

- *Cephalaria gigantea* (Ledeb.) Bobrov
- *Chamaesciadium acaule* (M.Bieb.) Boiss.
- *Rhynchocorys orientalis* (L.) Benth.

• Species of conservation concern

Red lists are inventories of the conservation status of plant and animal species throughout the world, as directed and compiled by scientists and conservationists. The IUCN Red List of Threatened Species is the world's most comprehensive inventory of the global conservation status of species. It uses a set of quantitative criteria to evaluate the extinction risk of thousands of species. These criteria are relevant to most species and all regions of the world. With its strong scientific base, The IUCN Red List is recognised as the most authoritative guide to the status of biological diversity. There are eight IUCN Red List Categories based on criteria linked to population trend, size and structure, and geographic range. Species listed as Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) are collectively described as threatened. Several red lists were checked in this report with respect to the geographic area studied: the Red Book of Plants of Armenia (http://www.mnp.am/red_book_fauna/) and, if relevant, the Red list of woody species in the Caucasus (ANONYMOUS, 2005). The IUCN Globally Threatened Species in the Caucasus Ecoregion was also consulted (BATSATSASHVILI *et al*., 2020).

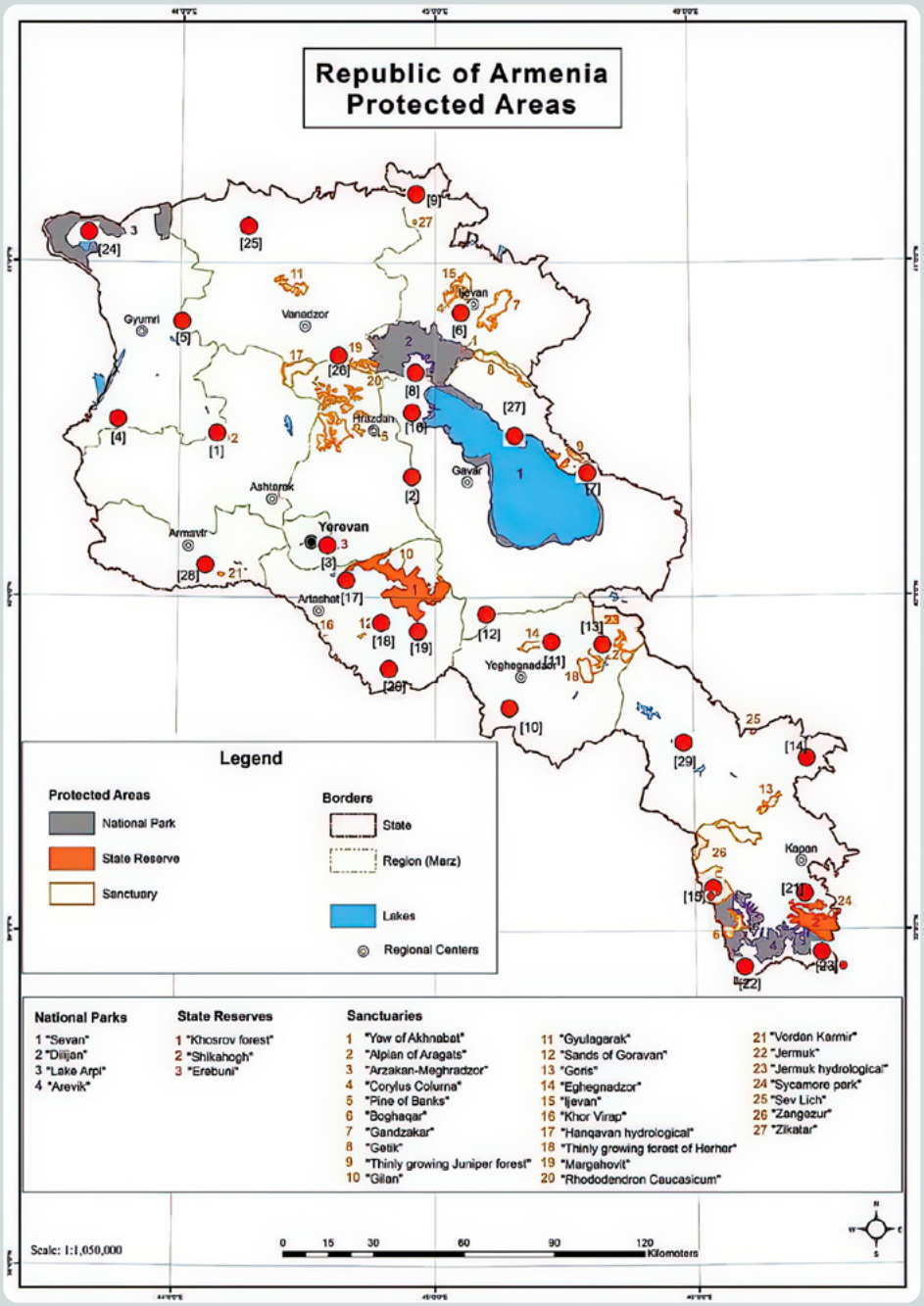
In the Red Book of Plants of Armenia 452 species of vascular plants (11.89 % of the flora of Armenia) and 40 species of fungi (1.05% of the biota of Armenia) are registered. Of them 141 species of plants and 6 species of fungi were assessed as Critically Endangered (CR) by IUCN criteria and they need urgent protection (VARDANYAN, 2014).
234 species were recorded during this trip. Endemic taxa are highlighted in the table featured in the appendix. Among them one is of conservation concern as «endangered» according to the Armenian IUCN Red List.



Taxon	Family	Armenian IUCN status and main causes of decline	Range	Comments
Nectaroscordum tripedale	*Alliaceae*	EN Loss/degradation of habitats caused by being situated in recreation zone and by intensive collection for sale	Endemic to Caucasus and Irak	Restricted extent of occurrence and area of occupancy

• Important Plants Areas (IPAs)

The computer database for the distribution of the endemic plant species in Armenia and the Caucasus, as well as the species included in the Red Book of plants of Armenia (TAMANYAN et al., 2010) served as the basis for the allocation of 29 Important Plant Areas in Armenia, according to the criteria A and B (TAMANYAN & FAYVUSH, 2009). These IPAs have been mapped on the Map of natural protected areas in Armenia. Later the work was continued on the allocation of IPAs in Armenia by the criterion C (ASATRYAN & FAYVUSH, 2013). Additional 16 IPAs based on the evaluation of the rarity of certain ecosystems have been allocated. Some of them coincide with the already allocated IPAs by criteria A and B.
The following map shows Important Plant Areas of Armenia according A and B criteria. Here are the ones we visited during this trip:



Important Plant Areas of Armenia (red dots) relying on A and B criteria.

- 24 - Arpi-Lich (Lake Arpi)
- 6 - Idjevan sanctuary
- 8 - Dilidjan
- 1 - Mount Aragats
- 27 - Ardanish peninsula (along Lake Sevan)

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Appendix

• Appendix 1: checklist of plant species recorded during the session

Species	Red data book of Armenia	Endemism
Acantholimnon sp.	LC	
Acer platanoides	LC	
Achillea arabica	LC	
Aconitum orientale	LC	
Aconogonon alpinum	LC	
Acroptilon repens	LC	
Agrimonia eupatoria	LC	
Ajuga orientalis	LC	
Alcea rugosa	LC	
Alhagi maurorum	LC	
Alopecurus glacialis	LC	
Althaea cannabina	LC	
Anthemis altissima	LC	
Arceuthobium oxycedri	LC	
Artemisia absinthium	LC	
Artemisia annua	LC	
Artemisia armeniacum	LC	
Artemisia austriaca	LC	
Asperula arvensis	LC	
Asplenium ruta-muraria	LC	
Asplenium trichomanes	LC	
Astragalus aureus	LC	
Astragalus cicer	LC	
Astragalus glycyphyllos	LC	
Asyneuma sp.	LC	
Atraphaxis spinosa	LC	
Beckmannia eruciformis	LC	
Berberis orientalis	LC	
Betonica macrantha	LC	
Blitum virgatum	LC	
Briza elatior	LC	
Bunias orientale	LC	
Bupleurum rotundifolium	LC	
Butomus umbellatus	LC	

Species	Red data book of Armenia	Endemism
Campanula alliariifolia	LC	
Campanula aucheri	LC	
Campanula stevenii	LC	
Campanula tridentata	LC	
Cannabis sativa	LC	
Capsella bursa-pastoris	LC	
Cardaria draba	LC	
Carex hartmanii	LC	
Carex hirta	LC	
Carex pallescens	LC	
Carex tristis	LC	
Carpinus betulus	LC	
Catabrosa aquatica	LC	
Centaurea diffusa	LC	
Centaurea ossethica	LC	
Centaurea polypodiifolia	LC	
Cephalaria gigantea	**LC**	Caucasus
Ceratocephala falcata	LC	
Chamaenerion angustifolium	LC	
Chamaesciadium acaule	**LC**	Caucasus
Chenopodium glaucum	LC	
Circaea lutetiana	LC	
Cirsium ciliatum	LC	
Cirsium echinus	LC	
Cleome ornithopodioides	LC	
Clinopodium vulgare	LC	
Convolvulus lineatus	LC	
Cornus mas	LC	
Corylus avellana	LC	
Cousinia macroptera	LC	
Crataegus orientalis	LC	
Cuscuta approximata	LC	
Cuscuta campestris	LC	
Cuscuta europaea	LC	
Cynanchicum acutum	LC	
Cynoglossum officinale	LC	
Cystopteris fragilis	LC	
Daphne oleoides	LC	

Species	Red data book of Armenia	Endemism
Daucus carota	LC	
Delphinium albiflorum/ochroleucum	LC	
Delphinium schmelhausenii	LC	
Deschampsia caespitosa	LC	
Dipsacus pilosus	LC	
Echium russicum	LC	
Ephedra procera	LC	
Eremogone gypsophiloides	LC	
Eremopyrum bonaepartis	LC	
Erigeron caucasicus subsp. venustus	LC	
Erodium absinthoides subsp. armenum	LC	
Euonymus europaeus	LC	
Euphorbia macroceras	LC	
Euphorbia seguieriana	LC	
Fagus orientalis	LC	
Falcaria vulgaris	LC	
Ferula rigidula	LC	
Festuca gigantea	LC	
Filipendula ulmaria	LC	
Filipendula vulgaris	LC	
Fragaria viridis	LC	
Fraxinus excelsior	LC	
Gagea glacialis	LC	
Galium verticillatum	LC	
Galium verum	LC	
Gentiana cruciata;	LC	
Gentiana verna subsp. *pontica*	LC	
Geranium sanguineum	LC	
Geum rivale	LC	
Geum urbanum	LC	
Glaucium corniculatum	LC	
Glyceria sp.	LC	
Glycyrrhiza glabra	LC	
Gymnadea conopsea	LC	
Hedysarum caucasicum	LC	
Helianthemum grandiflorum	LC	
Helianthemum ledifolium	LC	
Helichrysum armenium	LC	
Hesperis matronalis	LC	

Species	Red data book of Armenia	Endemism
Hordelymus europaeus	LC	
Hordeum bulbosum	LC	
Hordeum secalinum	LC	
Hypericum linarioides	LC	
Inula helenium	LC	
Inula oculus-christi	LC	
Jacobaea racemosa	LC	
Juncus alpino-articulatus	LC	
Juncus compressus	LC	
Juncus inflexus	LC	
Juniperus hemisphaerica	LC	
Jurinella moschus	LC	
Koelpinia linearis	LC	
Lactuca tatarica	LC	
Lallemantia peltata	LC	
Lapsana grandiflora	LC	
Lathyrus miniatus	LC	
Lathyrus pratensis	LC	
Lemna minor	LC	
Leonurus cardiaca	LC	
Lepidium draba	LC	
Lepidium perfoliatum	LC	
Lepidium vesicarium	LC	
Ligustrum vulgare	LC	
Lonicera iberica	LC	
Lycopus europaeus	LC	
Lysimachia punctata	LC	
Matricaria discoidea	LC	
Medicago sativa	LC	
Melampyrum chlorostachyum	LC	
Melissa officinalis	LC	
Mespilus germanica	LC	
Myosotis alpestris	LC	
Nectaroscordum tripedale	EN	
Nepeta mussinii	LC	
Nepeta nuda	LC	
Noaea mucronata	LC	
Oberna multifida	LC	
Onopordum acanthium	LC	

Species	Red data book of Armenia	Endemism
Onosma sericea	LC	
Ostrya carpinifolia	LC	
Papaver bracteatum	LC	
Parnassia palustris	LC	
Pedicularis sibthorpii	LC	
Peganum harmala	LC	
Phalaroides arundinacea	LC	
Phleum pratense	LC	
Phlomis pungens	LC	
Phlomoides laciniata	LC	
Picris hieracioides	LC	
Piptatherum virescens	LC	
Poa annua	LC	
Polygonum alpestre	LC	
Polygonum bellardii	LC	
Polygonum cognatum	LC	
Polygonum pulchellum	LC	
Potentilla anserina	LC	
Prangos ferulacea	LC	
Primula auriculata	LC	
Primula veris	LC	
Pyrethrum parthenium	LC	
Quercus iberica	LC	
Quercus macranthera	LC	
Ranunculus aragazi	LC	
Ranunculus arvensis	LC	
Rhamnus lycioides	LC	
Rhamnus pallasii	LC	
Rhinanthus minor	LC	
Rhynchocorys orientalis	**LC**	Caucasus
Rosa spinosissima	LC	
Rumex crispus	LC	
Salvia glutinosa	LC	
Salvia verticillata	LC	
Sambucus ebulus	LC	
Sanguisorba officinalis	LC	
Scabiosa bipinnata	LC	
Scabiosa micrantha	LC	
Schoenoplectus sp.	LC	

Species	Red data book of Armenia	Endemism
Scutellaria altissima	LC	
Scutellaria orientalis	LC	
Securigera varia	LC	
Sedum tenellum	LC	
Sempervivum caucasicum	LC	
Serratula tinctoria	LC	
Sibbaldia parviflora	LC	
Silene sisianica	LC	
Sisymbrium loeselii	LC	
Sophora alopecuroides	LC	
Sparganium erectum	LC	
Sparganium natans	LC	
Spiraea crenata	LC	
Stachys germanica	LC	
Stachys iberica	LC	
Stachys sylvatica	LC	
Stellaria persica	LC	
Symphytum asperum	LC	
Taeniatherum sp.	LC	
Tamus communis	LC	
Tanacetum balsamita	LC	
Tanacetum canescens	LC	
Teucrium chamaedrys	LC	
Teucrium orientale	LC	
Teucrium polium	LC	
Teucrium polium	LC	
Thalictrum minus	LC	
Tomanthea spectabilis	LC	
Torilis japonica	LC	
Tribulus terrestris	LC	
Trifolium alpestre	LC	
Trifolium canescens	LC	
Trifolium pannonicum	LC	
Trifolium pratense	LC	
Trifolium repens	LC	
Typha angustifolia	LC	
Typha latifolia	LC	
Valeriana tiliifolia	LC	
Veronica anagallis-aquatica	LC	

Species	Red data book of Armenia	Endemism
Viburnum lantana	LC	
Xanthium spinosa	LC	
Xeranthemum squarrosum	LC	
Zannichellia palustris	LC	
Zingeria trichopoda	LC	
Ziziphora sp.	LC	
Zygophyllum fabago	LC	

• Appendix 2: geographic coordinates of the locations

Location	X geographic coordinate	Y geographic coordinate	Dominant vegetation type
	WGS84 coordinate system		
Parakar	44.415539	40.164852	Shrubs and steppe communities
Metsamor	44.140899	40.146194	Shrubs and steppe communities
Talvorik	43.867530	40.086285	Shrubs and steppe communities
Turkish border	43.681139	40.136956	Shibliak (local steppe)
Aragyugh	44.546319	40.389014	Cultivated areas
Bjni	44.649936	40.460910	Hilly steppes
Aragats foothill	44.272598	40.366038	Caucasian Oak woodlands
Amber castle	44.225736	40.389504	Hemi-xeric shrublands
Arpi plateau	43.711571	41.022083	Wet meadows
Lake Qari	44.183537	40.472882	Alpine grassland
Idjevan sanctuary	45.117810	40.894992	Georgian Oak forests
Haghartsin monastery	44.890025	40.802190	Oriental Beech forests
Lake Sevan north	45.276178	40.461102	Low Juniper open communities