Ethnobotany of the Caucasus – Azerbaijan

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Introduction

Location

The Republic of Azerbaijan is located in the southeastern part of the Caucasus between 38°25′–41°55′, northern latitudes and 44°50′–50°51′ east longitudes at the crossroads of eastern Europe and south-west Asia. The mountains of the Greater and Lesser Caucasus occupy more than a half of the territory of Azerbaijan. The country is bordered by the Talysh Mountains in the south and by the Caspian Sea in the east. It is the largest country in the southern Caucasus (86,600 km^2), with a population of about 10 million. The extent of the territory from the north to the south is about 400 km, from the west to the east 500 km, with a coastline of 955 km (Fig. 1), and its altitude range 30 m below sea level to 4466 m (Mt. Bazarduzu).

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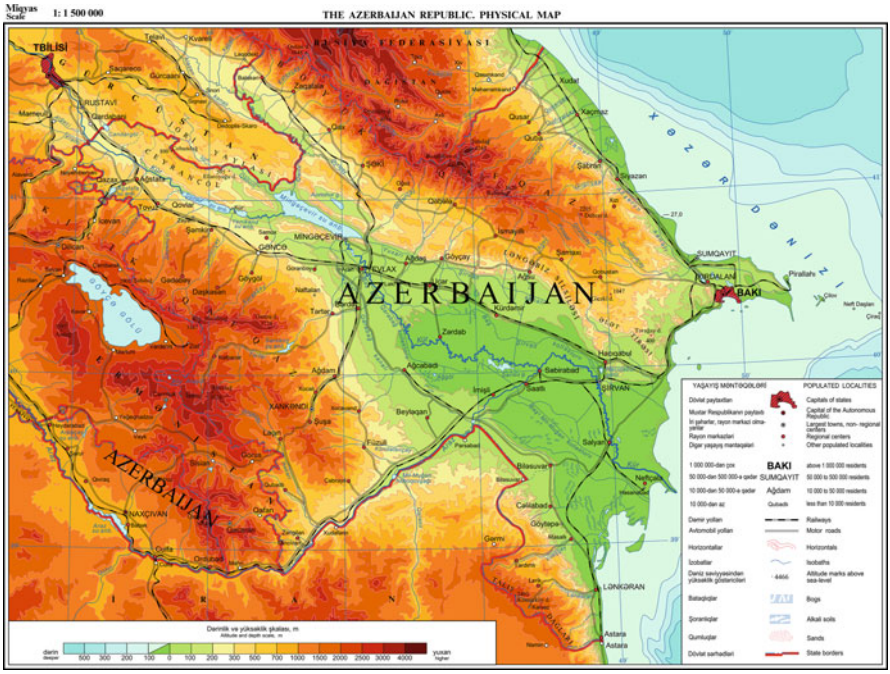

Fig. 1 Azerbaijan map

Geology

The territory of the Republic of Azerbaijan forms a part of the Alpine folded belt. The Greater Caucasus, the Kur river inter-montane trough, and the Lesser Caucasus constitute the principle structural systems in Azerbaijan. The south-western parts of the Greater and Lesser Caucasus, including the intermountain Kur river trough, as well as the Mid- and South Caspian troughs consist of folded systems with different structures.

The main morphostructural units of Azerbaijan are the Gusar sloping plane and the Samur-Devechi lowland, the Greater Caucasus, the Lesser Caucasus, the Kur intermountain depression (trough), the Garabagh volcanic upland, the near Araz Ridges; the Middle Araz Depression, and the Talysh Mountains. The Greater Caucasus gradually descends southeastward into the Gobustan-Absheron peninsula with low undulated foothills. The main Caucasian ridge with peaks like Bazardyuzyu (4466 m), Tufan (Tfan) (4191 m), Guton (3648 m), Babadagh (3629 m), Akhvai (3481 m), Tinov-Rosso (3374 m) has a narrow dividing crest with Alpine highlands, and a intensively broken nival-glacial relief. The South-Eastern Caucasus ends in the Absheron Peninsula. The eastern part of the Absheron peninsula is flat, with a maximum elevation of 38 m. Some sites are situated below

the sea level. The Garabagh anticline ridge with its Beyuk Kirs (2725 m), Ziyarat (2478 m), Gyrkhgyz (2823 m) peaks extends in the general Caucasian direction in the central part of the Lesser Caucasus. The Garabagh volcanic highland is situated southwestward of the Lesser Caucasus ridges and its relief is created by the Late Pliocene and Quaternary and andesite basaltic lava outflows. Major eruption centers are confined to abyssal fractures whereupon sit Upper Pliocene volcanoes and Quaternary cinder cones.

The Geology consists of sedimentary, volcanogenic-sedimentary, volcanogenic and continental deposits, embracing almost the entire stratigraphic range from the pre-Cambrian period up to the Holocene. Mesozoic and Cenozoic eugeosynclinal, miogeosynclinal and molasse deposits are ubiquitous, while paleozoic sub-cratonic and the Alpine pre-Cambrian-Paleozoic metamorphic deposits occupy smaller areas. The Kur river intermontane trough has been developed over a long geologic time span. However, its recent geometry was shaped only during the Oligocene-Quaternary period. The Lesser Caucasus trough extends parallel to the Lesser Caucasus and consists of Paleogene flysch deposits and Neogene-Antropogenic molasse formations. The Talish fold zone represents east extension of the central part of the Lesser Caucasus. It is located upon the pre-Alpine transversally uplifted basement and is formed of the thin carbonate formation of Upper Cretaceous and flysch deposits of Paleogene-Lower Eocene, traxy basalts of the Middle Eocene and flysch deposits of the Oligocene. Small intrusive bodies of alkali basalts, gabbro, diabaz-diorite and gabbro-monzonite-syenite formations are located within Paleogene (Alizadeh et al. 2016).

One of the most specific peculiarities of the Azerbaijan topography is the direct reflection of its large geotectonic structural features. The following basic orographic elements that simultaneously serve as its large morphostructural units are isolated in the Azerbaijan relief.

Climate

Azerbaijan is situated on the border of the temperate and subtropical climatic zones, with 1800–2900 sunshine hours during the year.

The geographical variation leads to a variety of climatic regions. Nine out of 13 main climate types are represented in the country. They are: I – the climate of semi-deserts and dry steppes: (1) mild winter; (2) severe winter; II – moderately warm climate: (3) dry summer; (4) dry winter; (5) uniform precipitation in all seasons; III – cold climate: (6) dry summers; (7) dry winter; (8) uniform distribution of precipitation in all seasons; IV – (9) mountain tundra climate (Madatzade and Shiklinskiy 1968; Baku Cartography Factory 2010).

The temperature varies depending on the relief. The average annual temperature in the Kur-Araz lowland is +14,5 °C, but in mountainous areas of the Greater and Lesser Caucasus temperatures often fall below 0 °C. In the plains the winter is warm and wet, summer is hot and dry. The average temperature in January in the Central

lowland and Absheron is 1–3 °C, in July −20–27 °C, with a maximum of 44 °C and minimum of −33 °C.

The precipitation is also unevenly distributed. Maximum precipitation is found in the plains in spring-autumn or in winter, and in the Greater and Lesser Caucasus in the late spring and summer. On the Absheron peninsula, Kur-Araz and other lowlands c the average annual precipitation is 200–400 mm. With rising altitude the rainfall increases and in the low mountains it reaches up to 400–600 mm, and at 1000 m above sea level the average is 600–1400 mm. The maximum precipitation is reached in the foothills of the Talysh Mountains and in the highlands of the Greater Caucasus with 1600–1800 mm, and the minimum – less than 200 mm, in the southern part of Absheron peninsula (Madatzade and Shiklinskiy 1968; Baku Cartography Factory 2010).

Biodiversity and Conservation

According to the recent literature data, the flora of Azerbaijan consists of about 5000 plant species, belonging to 1142 genera of 186 families (Asgarov 1961–2009), including 200 endemics of Azerbaijan and 950 endemics of the Caucasus (Musayev et al. 2009; Alizade 2010; Redlist Committee of Azerbaijan 2013). The most diverse plant families are *Asteraceae*, *Fabaceae*, *Poaceae*, *Lamiaceae*, *Brassicaceae* and *Rosaceae*.

The species of the flora of Azerbaijan are distributed in 20 phytogeographical regions. Among them the mountainous part of Nakhchivan stands out in terms of species diversity, with about 60% of all plant species of the country occurring there, followed by the Quba massif in the Greater Caucasus and the Lankaran-Mughan plain (Hajiyev and Akhundov 1987). The following vegetation zones and major ecosystem complexes are especially noteworthy: with an annual precipitation of less than 250 mm, the lowlands of Caspian Depression is the driest part of the country and southern Caucasia. They border the Caspian Sea (−28 m below sea-level), expand at some places considerably further inland, and are covered by semi-desert vegetation of the Aralo-Caspian type and by salt marshes. At the foothills of the mountains, steppe vegetation, dry scrubland and open steppe forest prevail, which merge with increasing altitude and precipitation into the broad-leaved forest of the Caucasus and Talysh mountain ranges. Oriental beech (*Fagus orientalis*) and oak (*Quercus* sp.) dominate in the canopy of the mountain forests. The Greater Caucasus forests often abound in chestnut (*Castanea sativa*), walnut (*Juglans regia*) and hazelnut (*Corylus avellana*). Both the Lesser and Greater Caucasus display a wealth of typically Caucasian high mountain vegetation. The Talysh area with its lush Hyrcanian relict forests represents a world of its own and is a green island in midst of much drier surroundings. Relict tree species such as *Parrotia persica* (DC.) C.A. Mey., *Pinus eldarica* Medw., *Albizia julibrissin* Durazz., *Quercus castaneifolia* C.A. Mey., *Diospyros lotus* L., *Buxus hyrcana* Pojark., *Ficus hyrcana* Grossh., *Acer hyrcanum* Fisch. et Mey., *Zelkova carpinifolia* (Pall.) C. Koch,

Pterocarya fraxinifolia (Michx.) Kunth ex I. Iljinsk are mainly concentrated here (Hajiyev et al. 1979). The Hyrcanian forest, which continues across the Iranian border, is a descendant of a forest ecosystem type that was widespread throughout the northern hemisphere during the Late Tertiary. The diversity of the flora and fauna gives these localised forests a global significance.

Literature references 1547 species of medicinal plants in the flora of Azerbaijan belonging to 740 genera and 178 families. Among them 122 species are woody, 115 shrubby, 13 subshrus, 11 shrubby lianas, one a liana, 22 dwarf subshrubs, 1191 herbs, 26 ferns, two mosses, one¡ club moss, six horsetails and 26 lichens (Mehdiyeva 2011, 2012, 2015). At present, 112 species of medicinal plants from 90 genera and 55 families are considered rare, endangered and disappearing (Redlist Committee of Azerbaijan 2013). Of them: 6 species are Critically Endangered, 22 to Endangered, 61 Vulnerable, and 21 Nit Thretened (Mehdiyeva and Zeynalova 2013a, b). Among the medicinal plants of Azerbaijan 77 species are endemics of the Caucasus e.g. *Aconitum nasutum* Fisch. ex Reichenb., *Alcea lenkoranica* Iljin, *Betula raddeana* Trautv., *Erysimum aureum* Bieb., *Hylotelephium caucasicum* (Grossh.) H. Ohba, *Rhododendron caucasicum* Pall., *Lilium ledebourii* (Baker) Boiss. Six species are endemics of Azerbaijan (*Anacyclus ciliatus Trautv.*, *Ficus hyrcana Grossh*., *Pinus eldarica Medw*., *Rosa azerbaidzhanica Novopokr. et Rzazade*, *Scutellaria karjaginii Grossh*., *Thymus karamarjanicus* Klokov et Des.-Shost.), and 44 species are relics (e.g. *Albizia julibrissin* Durazz., *Buxus hyrcana* Pojark., *Parrotia persica* (DC.) C.A. Mey., *Platanus orientalis L*., *Danae racemosa* (L.) *Moench*, *Hypericum androsaemum* L., *Zelkova carpinifolia* (Pall.) C. Koch, *Mespilus germanica* L. and etc.) (Mehdiyeva 2011).

The flora of Azerbaijan includes 640 species of aromatic plants, of which 21 are endemics of Caucasus (e.g. *Crataegus caucasica* C. Koch, *Ziziphora serpyllacea* Bieb., *Carum caucasicum* L.), and four endemics of Azerbaijan. Thirty-four species of aromatic plants from 28 genera and 15 families are included to the Red Book of the Azerbaijan (Mehdiyeva and Zeynalova 2013a, b).

Deserts, semi-deserts and wetland species are mostly found in the lowlands up to 200 m above sea level. Mainly annual and perennial xerophytic plants and shrubs occur in the plains at the foot of the Greater and Lesser Caucasus, at altitudes from 200 to 700, sometimes 1200 m. deciduous forests are found at 1200–1800 m, with 435 species of trees and shrubs, including 70 endemic species. As a result of anthropogenic and natural reasons the forest cover in the country has decreased from 35% to 11.4% during the last 200 years.

Biodiversity in general has declined over the last several decades. Whereas the Red Book of Azerbaijan 1989 listed 140 plant species as threatened (Redlist Committee of Azerbaijan 1989), in the new edition of Red Book of Azerbaijan (Redlist Committee of Azerbaijan 2013) lists now up to 300 taxa (266 vascular plants and 20 cryptogams, 14 mushroom) as endangered. Several plant species are already extinct from the flora of Azerbaijan and the populations of valuable species, such as *Quercus macranthera*, *Acer trautvetteri*, *Betula litwinowii*, *Paeonia mlokosewitschii* and *Prunus laurocerasus* have significantly decreased during the last 60–70 years as a result of anthropogenic impacts.

Protected areas for the conservation of biodiversity are irreplaceable as safe havens for many endangered plant species. In recent years, the proportion of protected areas increased from 4.5% to 10.2% of the country's total area. Today, there are 11 nature reserves and 8 national parks for conservation and the sustainable use of flora and fauna, and more protected areas are planned. Under the National Program on the Rehabilitation and Extension of Forests, 20,000 ha of forests were restored and 43,000 ha of forest land afforested which resulted in the increase of forest cover of Azerbaijan by 0.4% over the last years. *Ex situ* propagation or reintroduction of rare and endemic native species are also being carried out.

Many representatives of the flora of Azerbaijan possess useful, as well as nutritious, remedial, aromatic, tinctorial, tanning and other properties, and the issue of conservation of the biodiversity, especially, endangered useful plant species in the country is addressed by politics (National Strategy and Activity Plan 2006).

Plant Use History

In Azerbaijan, folk medicine with peculiar features has profound roots. The history of the use of medicinal plants has an ancient background in Azerbaijan and information on plant medicines has been handed down over the centuries. Even today, the preference of phytotherapy accepted by allopathic medicine. A total of 274 plant species included in the Pharmacopoeiae of the different countries of world grow also in Azerbaijan (Mehdiyeva 2015). Due to the geographical location of the Azerbaijan, ancient caravan trade routs, including the Silk Road passed through the country, and Azerbaijan lies at the crossroads of numerous religions and civilizations. Ancient Azerbaijani medicine was influenced by various healing systems, such as Turkic, Iranian, Semitic and Greek medicine, and the ancient inhabitants of Azerbaijan were distinguished by their knowledge in the field of medicine (Alakbarli 2006).

Some ancient Azeri folklore devoted to medicinal plants provides good evidence for the importance of herbal medicine. For example, short folk verses named "bayati" contain information about healing properties of yarpiz (water mint), uzerrik (harmel), zoghal (cornel), and yemishan (hawthorn). Traditionally, no part of a medicinal plant was wasted; all parts (seeds, flowers, leaves, stems and roots) were used. However, much research remains to be done, as out of 726 medicinal plants mentioned in early manuscripts, only 466 are known to grow in Azerbaijan today. Of these, 252 are not currently being used for any medicinal purpose at all (Alakbarli 2006).

People and nationalities settled in Azerbaijan widely used the plants also for the production of the weapons (bows, arrows, spears, shields etc.), household objects (tables, benches, wheels, pins, spoons, forks, shovels, troughs, ropes, baskest, mats, linen etc.), construction materials, as well as for other household and domestic needs. A detailed system of knowledge about medicinal plants was already present in Azerbaijan in the early Middle Ages, which is evidenced by the Azerbaijani scientist Abu Mansur Muvaffag all-Haravi (X century), who described 477 species of medicinal plants in his publications. In the XII century Azerbaijani scientist Kafiyaddin Omar founded school in Shamakhi where medicinal properties of herbs were studied.

Investigations of other Azerbaijani scientists such as Sheikh Ali Lankarani (XV century), Muhammad Byargushadi (XVII century), Haji Suleyman Khajar Iravani (XVII century), Muhammad Yusif Shirvani (XVIII century) and others show that this area of knowledge in Azerbaijan has always been in demand (Alekperov 1992, 1998). Over 700 years ago Azerbaijani scientists Yusif Ibn Ismayil Hoyi and Mahmud Ibn Ilyas Tabrizi proposed the theory of rational use of food (more plants as food, less salt, sugar and animal fats), and also wrote about the principles of psychotherapy, treatment with music, color and smell (Alekperov 1998). In total about 750 species of different plants were used in traditional medicine of medieval Azerbaijan (Alekperov 1992), and the traditions of a wide use of medicinal and aromatic plants in everyday life has remained important in Azerbaijan and until now.

Many aromatic plants are used as fragrances, flavorings and conservants in cooking, production of confectionery products, alcohol-free and alcohol-containing drinks, as well as in perfumery (Mehdiyeva and Zeynalova 2013a, b). Over 1500 species of dye plants belonging to 411 genera and 131 families grow in the flora of Azerbaijan. The range of colors and their shades obtained from these plants is very wide and varied. Over 100 colors and shades derived from dyes of plant origin were used to dye the yarn of the portrait carpet of Nizami Ganjavi, the greatest poet of the twelfth century of Azerbaijan. Dyes of vegetable origin are still widely used for dyeing raw materials and products from wool, silk, cotton, leather as well as for other purposes in the textile industry, in carpet weaving, tanning, food and perfumery (Gasimov 1998; Novruzov 2010). Over 800 species of the flora of Azerbaijan possess tannic properties, and they are also applied in various areas of economic and other activity (Gasimov and Gadirova 2004).

The historical use of plants in Azerbaijan is also reflected in numerous archeological artifacts and depicted in petroglyphs from the VI–II millenium BC. About 6000 such petroglyphs were discovered in the "Qobustan Rock Art Cultural Landscape" (Figs. 2, 3, 4, 5, and 6), an UNESCO World Heritage Site, on

Fig. 2 Gobustan National Park in Azerbaijan (Photo Selimov R.)

Fig. 3 Gobustan Rock Art Cultural Landscape (Photo Selimov R.)

Fig. 4 Gobustan rock pictures. Gobustan Rock Art Cultural Landscape (Photo Selimov R.)

the Abşeron Peninsula. This unique collection of petroglyphs provides substantial evidence on hunting, fauna, flora and lifestyle in prehistoric times. Over 1500 rock carvings were found in the complex of Gamigaya (dated to the IV–I millennium) in the territory of the Ordubad region of Nakhchivan Autonomous Republic. Gamigaya (in translation from Azerbaijani "the stone ship") is also a legendary popular name of the highest peak of the Lesser Caucasus (Mt. Gapyjiq 3906 m).

The diversity and uniqueness of unspoiled landscapes far from urbanization and agriculture form a huge and ideal base for ecotourism in Azerbaijan (Mammadov et al. 2012). The Azykh Cave in Garabagh (Huseynov 1981) and Buzeyir Cave near Lerik (Institute of Archaeology 2008) are sites where stone-age humans lived. Located in the South-western and South-eastern parts of Azerbaijan, they are considered one of the oldest proto-human dwelling places in Eurasia.

Fig. 5 Petroglyphs of oxen. Gobustan Rock Art Cultural Landscape (Photo Selimov R.)

Fig. 6 Rock paintings in Gobustan (Photo Selimov R.)

Anttractive source of income, especially for German immigrants immigrants from Württemberg, who settled in the North-western part of Azerbaijan in early nineteenth century was also grape-growing and wine-making. Germans played an important role in the development of the wine industry. The cultivation of grapes and wine-making has a long history in Azerbaijan. Archaeologists have found jars with remains of wines in the Göygöl region dating back to the second millennium BC (Robinson 2006).

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